

<b>SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEMS</b> <i>OFFEROR TO COMPLETE BLOCKS 12, 17, 23, 24, AND 30</i>				1. REQUISITION NUMBER W917PM11044901		PAGE 1 OF 87	
2. CONTRACT NO.		3. AWARD/EFFECTIVE DATE		4. ORDER NUMBER		5. SOLICITATION NUMBER W5J9LE-11-T-0004	
7. FOR SOLICITATION INFORMATION CALL:		a. NAME JOHN M PEREZ				b. TELEPHONE NUMBER (No Collect Calls)	
8. OFFER DUE DATE/LOCAL TIME 05:00 PM 30 May 2011		9. ISSUED BY AFGHANISTAN DISTRICT SOUTH (AES) US ARMY CORPS OF ENGINEERS APO AE 09355  TEL: FAX:		CODE W5J9LE		10. THIS ACQUISITION IS <input checked="" type="checkbox"/> UNRESTRICTED <input type="checkbox"/> SET ASIDE: % FOR <input type="checkbox"/> SB <input type="checkbox"/> HUBZONE SB <input type="checkbox"/> 8(A) <input type="checkbox"/> SVC-DISABLED VET-OWNED SB <input type="checkbox"/> EMERGING SB SIZE STD: NAICS:	
11. DELIVERY FOR FOB DESTINATION UNLESS BLOCK IS MARKED <input type="checkbox"/> SEE SCHEDULE		12. DISCOUNT TERMS		13a. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700) <input type="checkbox"/>		13b. RATING	
14. METHOD OF SOLICITATION <input checked="" type="checkbox"/> RFQ <input type="checkbox"/> IFB <input type="checkbox"/> RFP		15. DELIVER TO AFGHANISTAN DISTRICT SOUTH (AES) BENJAMIN E JENKINS US ARMY CORPS OF ENGINEERS 720 KAF RD KANDAHAR AIRFIELD KANDAHAR TEL: (540) 667-6467 FAX:		CODE W5J9LE		16. ADMINISTERED BY CODE	
17a. CONTRACTOR/OFFEROR   TEL. FACILITY CODE		CODE		18a. PAYMENT WILL BE MADE BY   CODE			
<input type="checkbox"/> 17b. CHECK IF REMITTANCE IS DIFFERENT AND PUT SUCH ADDRESS IN OFFER		<input type="checkbox"/> 18b. SUBMIT INVOICES TO ADDRESS SHOWN IN BLOCK 18a. UNLESS BLOCK BELOW IS CHECKED <input type="checkbox"/> SEE ADDENDUM					
19. ITEM NO.	20. SCHEDULE OF SUPPLIES/ SERVICES			21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
	<b>SEE SCHEDULE</b>						
25. ACCOUNTING AND APPROPRIATION DATA						26. TOTAL AWARD AMOUNT (For Govt. Use Only)	
<input type="checkbox"/> 27a. SOLICITATION INCORPORATES BY REFERENCE FAR 52.212-1. 52.212-4. FAR 52.212-3. 52.212-5 ARE ATTACHED. ADDENDA <input type="checkbox"/> ARE <input type="checkbox"/> ARE NOT ATTACHED <input type="checkbox"/> 27b. CONTRACT/PURCHASE ORDER INCORPORATES BY REFERENCE FAR 52.212-4. FAR 52.212-5 IS ATTACHED. ADDENDA <input type="checkbox"/> ARE <input type="checkbox"/> ARE NOT ATTACHED							
28. CONTRACTOR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN <u>2</u> COPIES <input checked="" type="checkbox"/> TO ISSUING OFFICE. CONTRACTOR AGREES TO FURNISH AND DELIVER ALL ITEMS SET FORTH OR OTHERWISE IDENTIFIED ABOVE AND ON ANY ADDITIONAL SHEETS SUBJECT TO THE TERMS AND CONDITIONS SPECIFIED HEREIN.				29. AWARD OF CONTRACT: REFERENCE <input type="checkbox"/> OFFER DATED . YOUR OFFER ON SOLICITATION (BLOCK 5), INCLUDING ANY ADDITIONS OR CHANGES WHICH ARE SET FORTH HEREIN, IS ACCEPTED AS TO ITEMS:			
30a. SIGNATURE OF OFFEROR/CONTRACTOR				31a. UNITED STATES OF AMERICA SIGNATURE OF CONTRACTING OFFICER		31c. DATE SIGNED	
30b. NAME AND TITLE OF SIGNER (TYPE OR PRINT)		30c. DATE SIGNED		31b. NAME OF CONTRACTING OFFICER (TYPE OR PRINT)  TEL: EMAIL:			

**SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEMS  
(CONTINUED)**

PAGE 2 OF 60

19. ITEM NO.	20. SCHEDULE OF SUPPLIES/ SERVICES	21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
	<b>SEE SCHEDULE</b>				

32a. QUANTITY IN COLUMN 21 HAS BEEN

☐ RECEIVED ☐ INSPECTED ☐ ACCEPTED, AND CONFORMS TO THE CONTRACT, EXCEPT AS NOTED: \_\_\_\_\_

32b. SIGNATURE OF AUTHORIZED GOVERNMENT  
REPRESENTATIVE

32c. DATE

32d. PRINTED NAME AND TITLE OF AUTHORIZED GOVERNMENT  
REPRESENTATIVE

32e. MAILING ADDRESS OF AUTHORIZED GOVERNMENT REPRESENTATIVE

32f. TELEPHONE NUMBER OF AUTHORIZED GOVERNMENT REPRESENTATIVE

32g. E-MAIL OF AUTHORIZED GOVERNMENT REPRESENTATIVE

33. SHIP NUMBER

34. VOUCHER NUMBER

35. AMOUNT VERIFIED  
CORRECT FOR

36. PAYMENT

☐ COMPLETE ☐ PARTIAL ☐ FINAL

37. CHECK NUMBER

38. S/R ACCOUNT NUMBER

39. S/R VOUCHER NUMBER

40. PAID BY

41a. I CERTIFY THIS ACCOUNT IS CORRECT AND PROPER FOR PAYMENT

41b. SIGNATURE AND TITLE OF CERTIFYING OFFICER

41c. DATE

42a. RECEIVED BY *(Print)*

42b. RECEIVED AT *(Location)*

42c. DATE REC'D *(YY/MM/DD)*

42d. TOTAL CONTAINERS

**Section SF 1449 - CONTINUATION SHEET****BID SCHEDULE**

Offeror will provide per UNIT PRICE and total price under “NET AMOUNT” column. The offeror will state a 90 or 180 day delivery under “DELIVERY SCHEDULE” column. Proposed pricing shall be inclusive of all direct and indirect costs (mobilization, demobilization, overhead, profit etc.). All items are fixed-price and FOB Destination.

ITEM	DESCRIPTION	UOM	QNTY	DELIVERY SCHEDULE (90 OR 180 DAYS)	UNIT PRICE	NET AMOUNT
	<b><u>ENERGY METERS</u></b>					
<b>001A</b>	Digital Energy Meters - 1ph 10(40)A	EA	40,000			
<b>001B</b>	Digital Energy Meters - 1ph 20(60)A	EA	10,000			
<b>001C</b>	Digital Energy Meters - 3ph 10(40)A	EA	60			
<b>001D</b>	Digital Energy Meters - 3ph 20(60)A	EA	60			
<b>001E</b>	Digital Energy Meters - 3ph 50(100)A	EA	60			
<b>001F</b>	Digital Energy Meters - 3ph 5A w/CTs 200/5	EA	60			
<b>001G</b>	Digital Energy Meters - 3ph 5A w/CTs 400/5	EA	60			
<b>002</b>	Current Transformer 200/5A CT - 200/5A CT	EA	60			
<b>003</b>	Current Transformer - 400/5A CT	EA	60			
<b>004</b>	ZARA 300/310 - Test device	EA	1			
<b>005</b>	DISCOS Boundary/Logger 3ph 20kv	EA	6			

<b>006</b>	Insulators	EA	150			
<b>007</b>	Poles - Concrete 12m	EA	50			
<b>008</b>	Weather Stations (T, RH, WD, BP)	EA	3			
	<b><u>LOW VOLTAGE LUGS</u></b>					
<b>016A</b>	Low voltage terminal lugs - 10mm2 x 6,	EA	500			
<b>016B</b>	Low voltage terminal lugs - 10mm2 x 10,	EA	500			
<b>016C</b>	Low voltage terminal lugs - 16mm2 x 6,	EA	500			
<b>016D</b>	Low voltage terminal lugs - 16mm2 x 10,	EA	500			
<b>016E</b>	Low voltage terminal lugs - 25mm2 x 8,	EA	500			
<b>016F</b>	Low voltage terminal lugs - 25mm2 x 12	EA	500			
<b>016H</b>	Low voltage terminal lugs - 50mm2 x 10,	EA	500			
<b>016I</b>	Low voltage terminal lugs - 50mm2 x 14	EA	500			
<b>016J</b>	Low voltage terminal lugs - 95mm2 x 12,	EA	500			
<b>016K</b>	Low voltage terminal lugs - 95mm2 x 16,	EA	500			
<b>016L</b>	Low voltage terminal lugs - 150mm2 x 12,	EA	500			
<b>016M</b>	Low voltage terminal lugs - 150mm2 x 16,	EA	500			
<b>017</b>	Automatic Splice - Aluminum automatic tension splice, ACSR 120/20 overall diameter 15.5mm	EA	200			
<b>018</b>	Steel Cross arm - 6 ft steel arm	EA	100			
<b>019</b>	Metal Pole - 40ft steel pole, class 3 equivalent	EA	250			
<b>020</b>	Post Insulator - 20kv insulator	EA	150			

<b>021</b>	Insulator Pin - Stud assembly for insulator	EA	150			
<b>022</b>	Dead End Insulator - 20kv dead end insulator	EA	50			
<b>023</b>	Dead End Shoe - Aluminum wedge type tension clamp range to 120mm conductor(wire grip)	EA	50			
<b>024</b>	Fused Cutout - 100 amp fused cutout	EA	25			
<b>025</b>	Lightning Arrestor - 20kv lightning arrestor	EA	10			
<b>026</b>	Ground Rod - Copper ground rod(16mm x 1800mm)	EA	25			
<b>027</b>	Ground Rod Connector - 16mm copper ground rod clamp	EA	25			
<b>028</b>	Eye Nut - 16mm oval eye nut	EA	50			
<b>029</b>	Bolt - 16mm x 200mm	EA	50			
<b>030</b>	Aluminum #4 awg - Soft drawn tie wire 250 ft coil	EA	2			
<b>031</b>	Washer - 16mm square washer 75mm x 75mm x 8mm	EA	100			
<b>032</b>	Aluminum Conductor - 120/20 ACSR wire (KM)	EA	120			
<b>TOTAL</b>				<b>N/A</b>	<b>N/A</b>	

**-- END OF SECTION --**

## **INSTRUCTIONS TO OFFERORS**

### **1. GENERAL**

This project consists of the procurement and delivery of electrical equipment and materials for the Afghan Government owned electric utility system, Da Afghanistan Breshna Shirkat (DABS). All electrical equipment and materials procured shall be in new condition, not used previously or reconditioned.

The intent of this Request for Quote is to select one contractor for the purchased of electrical equipment and materials.

The basis of award is Lowest Price for electrical equipment and materials that meet the technical requirements in the SCOPE OF WORK. The Contracting Officer will award a firm fixed price contract to the responsible offeror.

### **2. PROPOSAL SUBMISSION REQUIRMENTS**

#### **2.1 BID SCHEDULE**

The offeror shall complete and submit the BID SCHEDULE.

#### **2.2 DOCUMENTS**

The offeror shall submit the following along with the completed BID SCHEDULE:

- a. Manufacturer's cut sheets with photos;
- b. Data sheets;
- c. And specifications.

### **3. PROPOSAL SUBMISSION ADDRESS**

Proposal must be submitted electronically (softcopy).

Softcopy proposals are to be submitted to the following email address:

[john.m.perez@usace.army.mil](mailto:john.m.perez@usace.army.mil) **AND** [TAS.Contracting@usace.army.mil](mailto:TAS.Contracting@usace.army.mil)

Proposals will be accepted until the date and time on Block #8 of the Standard Form 1449. This is LOCAL KANDAHAR, AFGHANISTAN time.

**-- END OF SECTION --**

# **SCOPE OF WORK**

## **1. SUMMARY OF WORK**

This project consists of the procurement and delivery of electrical equipment and materials for the Afghan Government owned electric utility system, Da Afghanistan Breshna Shirkat (DABS). All electrical equipment and materials procured shall be in new condition, not used previously or reconditioned.

Electrical equipment and materials to be procured are in the BID SCHEDULE. In addition, offeror must provide the submittal items stated in paragraph 1.2 (DOCUMENTS).

The technical requirements for electrical equipment and materials to be provided are in paragraph 4 (TECHNICAL EQUIPMENT AND MATERIAL REQUIREMENTS).

All electrical equipment and materials to be procured under this contract shall comply with the latest applicable standards and recommendation of the International Electrotechnical Commission (IEC), International Standards Organization (ISO), or the British Standards Institution (BSI).

The electrical equipment and materials need to be delivered as soon as possible; no later than 180 days after contract award. The delivery schedule on the bid schedule needs to be completed for short lead time items (delivery dates less than 90 days) and long lead time items (delivery dates exceeding 90 days).

Electrical equipment procured under the resultant contract shall be delivered to the location indicated in paragraph 2 (LOCATION). Deliveries need to be coordinated with the POC seven days in advance. Prior to shipment from point of purchase, each piece of electrical equipment shall be tagged or otherwise marked or labeled. Such labeling may be placed or affixed to the container, box or packaging in which equipment items are located when it is not feasible to place or affix such labeling directly on each piece of equipment. Tags or labels shall include, but not necessarily be limited to; equipment name, description, and/or other data.

All electrical equipment items shall be provided with manufacturer's standard warranties. Warranties, original calibration sheets, and manufacturer's cut sheets indicating recommended storage requirements shall be affixed in weatherproof pouches to the outside of shipping packaging for all items.

### **1.1 ENGLISH LANGUAGE REQUIREMENT**

All information shall be presented in English. The Contractor shall have a minimum of one English-speaking representative to communicate at all times.

### **1.2 SUBMITTALS**

Manufacturer's cut sheets with photos, data sheets, and specifications shall be submitted with the offer.

### **1.3 TECHNICAL STANDARDS**

The following list of technical documents form a part of this contract in as far as they relate to the specific items listed in paragraph 4 (TECHNICAL EQUIPMENT AND MATERIAL REQUIREMENTS). They are in addition to the technical requirements provided in Appendix A-F. The Government will provide electronic copies of these documents upon request of the contractor.

- Ministry of Energy and Water, Rehabilitation and Extension of the Kabul City distribution Network, Chapter U, dated 01.2005.
- Aybek EPC Mobile Generator Step-UP Packaged Substation and 20Kv Distribution Network, Technical Specifications VI, Parts 1-5.

## 2. LOCATION

Electrical equipment and materials shall be delivered to the following:

Shorandam Industrial Park  
POC: SGT Terry Dietrich (249<sup>th</sup> Prime Power)  
PHONE: 312-265-1597

Approximate Grid Coordinates: MGRS41RQQ679799750

## 3. BRAND NAME OR EQUAL SPECIFICATIONS (FAR 36.202).

Whenever a brand name or manufacturer's specification is used throughout this Scope of Work as a means to identify a particular item(s), the contractor shall have the option to submit for review and approval items by other manufactures if the Item(s) is considered an "or equal" having similar physical, performance and functional characteristics. The purchase description of a brand name item reflects the characteristics and level of quality that will satisfy the Government's needs (FAR 52.211-6). Nothing in this Scope of Work is intended to limit full and open competition.

## 4. TECHNICAL EQUIPMENT AND MATERIAL REQUIREMENTS

The following table indicates the technical equipment and material requirements:

ITEM	DESCRIPTION	TECHNICAL REQUIREMENTS
	<u>ENERGY METERS</u>	
001A	Digital Energy Meters -1ph 10(40)A	Per Specifications in appendix A
001B	Digital Energy Meters - 1ph 20(60)A	Per Specifications in appendix A
001C	Digital Energy Meters - 3ph 10(40)A	Use the Single Phase Meter Specification provided in appendix A
001D	Digital Energy Meters - 3ph 20(60)A	Use the Single Phase Meter Specification provided in appendix A
001E	Digital Energy Meters - 3ph 50(100)A	Use the Single Phase Meter Specification provided in appendix A
001F	Digital Energy Meters - 3ph 5A w/CTs 200/5	Use the Single Phase Meter Specification provided in appendix A
001G	Digital Energy Meters - 3ph 5A w/CTs 400/5	Use the Single Phase Meter Specification provided in appendix A
002	Current Transformer 200/5A CT - 200/5A CT	This is a subcomponent of the 3 ph meters to allow for remote measurement of the line values. The transformer is required to be matched to the specific three phase meter.



<b>003</b>	Current Transformer - 400/5A CT	This is a subcomponent of the 3 ph meters to allow for remote measurement of the line values. The transformer is required to be matched to the specific three phase meter.
<b>004</b>	ZARA 300/310 - Test device	<p>Model MT300/MT310 Manufactured by ZERA GmbH of Konigswinter Germany or <u>approved equal</u>.</p> <p>Contact information:</p> <p>Web: <a href="http://www.zera.de">www.zera.de</a></p> <p>Phone: +49 2223-704-0</p> <p>Fax: +49 2223-704-70</p>
<b>005</b>	DISCOS Boundary/Logger 3ph 20kv	The product specification provided in appendix B, is an example of a Boundary Logger meeting the Government needs. "Or Equal" Boundary Loggers from other manufacturers may be submitted provided they meet or exceed the saline characteristic outlined in the DISCOS information.
<b>006</b>	Insulators	Ministry of Water and Power, Chapter U – Distribution Standards, dated January, 2005.
<b>007</b>	Poles - Concrete 12m	Per Specifications in appendix C
<b>008</b>	Weather Stations (T,RH, WD, BP)	Per Specifications in Appendix D
	<b><u>LOW VOLTAGE LUGS</u></b>	
<b>016A</b>	Low voltage terminal lugs - 10mm <sup>2</sup> x 6,	Per Specification Sheet in Appendix E
<b>016B</b>	Low voltage terminal lugs - 10mm <sup>2</sup> x 10,	Per Specification Sheet in Appendix E
<b>016C</b>	Low voltage terminal lugs - 16mm <sup>2</sup> x 6,	Per Specification Sheet in Appendix E
<b>016D</b>	Low voltage terminal lugs - 16mm <sup>2</sup> x 10,	Per Specification Sheet in Appendix E
<b>016E</b>	Low voltage terminal lugs - 25mm <sup>2</sup> x 8,	Per Specification Sheet in Appendix E
<b>016F</b>	Low voltage terminal lugs - 25mm <sup>2</sup> x 12	Per Specification Sheet in Appendix E
<b>016H</b>	Low voltage terminal lugs - 50mm <sup>2</sup> x 10,	Per Specification Sheet in Appendix E

<b>016I</b>	Low voltage terminal lugs - 50mm <sup>2</sup> x 14	Per Specification Sheet in Appendix E
<b>016J</b>	Low voltage terminal lugs - 95mm <sup>2</sup> x 12,	Per Specification Sheet in Appendix E
<b>016K</b>	Low voltage terminal lugs - 95mm <sup>2</sup> x 16,	Per Specification Sheet in Appendix E
<b>016L</b>	Low voltage terminal lugs - 150mm <sup>2</sup> x 12,	Per Specification Sheet in Appendix E
<b>016M</b>	Low voltage terminal lugs - 150mm <sup>2</sup> x 16,	Per Specification Sheet in Appendix E
<b>017</b>	Automatic Splice - Aluminum automatic tension splice, ACSR 120/20 overall diameter 15.5mm	Ministry of Water and Power, Chapter U – Distribution Standards, dated January, 2005 and the data sheet in appendix F.
<b>018</b>	Steel Cross arm - 6 ft steel arm	Ministry of Water and Power, Chapter U – Distribution Standards, dated January, 2005.
<b>019</b>	Metal Pole - 40ft steel pole, class 3 equivalent	Ministry of Water and Power, Chapter U – Distribution Standards, dated January, 2005.
<b>020</b>	Post Insulator - 20kv insulator	Ministry of Water and Power, Chapter U – Distribution Standards, dated January, 2005.
<b>021</b>	Insulator Pin - Stud assembly for insulator	Ministry of Water and Power, Chapter U – Distribution Standards, dated January, 2005.
<b>022</b>	Dead End Insulator - 20kv dead end insulator	Ministry of Water and Power, Chapter U – Distribution Standards, dated January, 2005.
<b>023</b>	Dead End Shoe - Aluminum wedge type tension clamp range to 120mm conductor(wire grip)	Ministry of Water and Power, Chapter U – Distribution Standards, dated January, 2005.
<b>024</b>	Fused Cutout - 100 amp fused cutout	Ministry of Water and Power, Chapter U – Distribution Standards, dated January, 2005.
<b>025</b>	Lightning Arrestor - 20kv lightning arrestor	Ministry of Water and Power, Chapter U – Distribution Standards, dated January, 2005.
<b>026</b>	Ground Rod - Copper ground rod(16mm x 1800mm)	Ministry of Water and Power, Chapter U – Distribution Standards, dated January, 2005.
<b>027</b>	Ground Rod Connector - 16mm	Ministry of Water and Power, Chapter U – Distribution Standards, dated January, 2005.

	copper ground rod clamp	
<b>028</b>	Eye Nut - 16mm oval eye nut	Ministry of Water and Power, Chapter U – Distribution Standards, dated January, 2005.
<b>029</b>	Bolt - 16mm x 200mm	Ministry of Water and Power, Chapter U – Distribution Standards, dated January, 2005.
<b>030</b>	Aluminum #4 awg - Soft drawn tie wire 250 ft coil	Ministry of Water and Power, Chapter U – Distribution Standards, dated January, 2005.
<b>031</b>	Washer - 16mm square washer 75mm x 75mm x 8mm	Ministry of Water and Power, Chapter U – Distribution Standards, dated January, 2005.
<b>032</b>	Aluminum Conductor - 120/20 ACSR wire (KM)	Ministry of Water and Power, Chapter U – Distribution Standards, dated January, 2005.

## **5. COMPLETION OF WORK**

All electronic technical equipment and materials need to be delivered as soon as possible, but no later an 180 days after contract award.

## **6. LIST OF APPENDIXICES**

APPENDIX A - SINGLE AND THREE PHASE METERS

APPENDIX B - BOUNDARY LOGGER 3 PH 20 KV

APPENDIX C – REINFORCED CONCRETE PLOE

APPENDIX D – WEATHER STATION

APPENDIX E - TERMINAL LUGS

APPENDIX F - TECHNICAL DATA OVERHEAD LINE CONDUCTORS

**-- END OF SECTION --**

## **CONTRACT CLAUSES**

### **CLAUSES INCORPORATED BY FULL TEXT**

#### 52.212-1 INSTRUCTIONS TO OFFERORS--COMMERCIAL ITEMS (JUN 2008)

(a) North American Industry Classification System (NAICS) code and small business size standard. The NAICS code and small business size standard for this acquisition appear in Block 10 of the solicitation cover sheet (SF 1449). However, the small business size standard for a concern which submits an offer in its own name, but which proposes to furnish an item which it did not itself manufacture, is 500 employees.

(b) Submission of offers. Submit signed and dated offers to the office specified in this solicitation at or before the exact time specified in this solicitation. Offers may be submitted on the SF 1449, letterhead stationery, or as otherwise specified in the solicitation. As a minimum, offers must show--

(1) The solicitation number;

(2) The time specified in the solicitation for receipt of offers;

(3) The name, address, and telephone number of the offeror;

(4) A technical description of the items being offered in sufficient detail to evaluate compliance with the requirements in the solicitation. This may include product literature, or other documents, if necessary;

(5) Terms of any express warranty;

(6) Price and any discount terms;

(7) "Remit to" address, if different than mailing address;

(8) A completed copy of the representations and certifications at FAR 52.212-3 (see FAR 52.212-3(b) for those representations and certifications that the offeror shall complete electronically);

(9) Acknowledgment of Solicitation Amendments;

(10) Past performance information, when included as an evaluation factor, to include recent and relevant contracts for the same or similar items and other references (including contract numbers, points of contact with telephone numbers and other relevant information); and

(11) If the offer is not submitted on the SF 1449, include a statement specifying the extent of agreement with all terms, conditions, and provisions included in the solicitation. Offers that fail to furnish required representations or information, or reject the terms and conditions of the solicitation may be excluded from consideration.

(c) Period for acceptance of offers. The offeror agrees to hold the prices in its offer firm for 30 calendar days from the date specified for receipt of offers, unless another time period is specified in an addendum to the solicitation.

(d) Product samples. When required by the solicitation, product samples shall be submitted at or prior to the time specified for receipt of offers. Unless otherwise specified in this solicitation, these samples shall be submitted at no expense to the Government, and returned at the sender's request and expense, unless they are destroyed during preaward testing.

(e) Multiple offers. Offerors are encouraged to submit multiple offers presenting alternative terms and conditions or commercial items for satisfying the requirements of this solicitation. Each offer submitted will be evaluated separately.

(f) Late submissions, modifications, revisions, and withdrawals of offers:

(1) Offerors are responsible for submitting offers, and any modifications, revisions, or withdrawals, so as to reach the Government office designated in the solicitation by the time specified in the solicitation. If no time is specified in the solicitation, the time for receipt is 4:30 p.m., local time, for the designated Government office on the date that offers or revisions are due.

(2)(i) Any offer, modification, revision, or withdrawal of an offer received at the Government office designated in the solicitation after the exact time specified for receipt of offers is "late" and will not be considered unless it is received before award is made, the Contracting Officer determines that accepting the late offer would not unduly delay the acquisition; and--

(A) If it was transmitted through an electronic commerce method authorized by the solicitation, it was received at the initial point of entry to the Government infrastructure not later than 5:00 p.m. one working day prior to the date specified for receipt of offers; or

(B) There is acceptable evidence to establish that it was received at the Government installation designated for receipt of offers and was under the Government's control prior to the time set for receipt of offers; or

(C) If this solicitation is a request for proposals, it was the only proposal received.

(ii) However, a late modification of an otherwise successful offer, that makes its terms more favorable to the Government, will be considered at any time it is received and may be accepted.

(3) Acceptable evidence to establish the time of receipt at the Government installation includes the time/date stamp of that installation on the offer wrapper, other documentary evidence of receipt maintained by the installation, or oral testimony or statements of Government personnel.

(4) If an emergency or unanticipated event interrupts normal Government processes so that offers cannot be received at the Government office designated for receipt of offers by the exact time specified in the solicitation, and urgent Government requirements preclude amendment of the solicitation or other notice of an extension of the closing date, the time specified for receipt of offers will be deemed to be extended to the same time of day specified in the solicitation on the first work day on which normal Government processes resume.

(5) Offers may be withdrawn by written notice received at any time before the exact time set for receipt of offers. Oral offers in response to oral solicitations may be withdrawn orally. If the solicitation authorizes facsimile offers, offers may be withdrawn via facsimile received at any time before the exact time set for receipt of offers, subject to the conditions specified in the solicitation concerning facsimile offers. An offer may be withdrawn in person by an offeror or its authorized representative if, before the exact time set for receipt of offers, the identity of the person requesting withdrawal is established and the person signs a receipt for the offer.

(g) Contract award (not applicable to Invitation for Bids). The Government intends to evaluate offers and award a contract without discussions with offerors. Therefore, the offeror's initial offer should contain the offeror's best terms from a price and technical standpoint. However, the Government reserves the right to conduct discussions if later determined by the Contracting Officer to be necessary. The Government may reject any or all offers if such action is in the public interest; accept other than the lowest offer; and waive informalities and minor irregularities in offers received.

(h) Multiple awards. The Government may accept any item or group of items of an offer, unless the offeror qualifies the offer by specific limitations. Unless otherwise provided in the Schedule, offers may not be submitted for quantities less than those specified. The Government reserves the right to make an award on any item for a quantity less than the quantity offered, at the unit prices offered, unless the offeror specifies otherwise in the offer.

(i) Availability of requirements documents cited in the solicitation. (1)(i) The GSA Index of Federal Specifications, Standards and Commercial Item Descriptions, FPMR Part 101-29, and copies of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained for a fee by submitting a request to--GSA Federal Supply Service Specifications Section, Suite 8100, 470 East L'Enfant Plaza, SW, Washington, DC 20407, Telephone (202) 619-8925, Facsimile (202) 619-8978.

(ii) If the General Services Administration, Department of Agriculture, or Department of Veterans Affairs issued this solicitation, a single copy of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained free of charge by submitting a request to the addressee in paragraph (i)(1)(i) of this provision. Additional copies will be issued for a fee.

(2) Most unclassified Defense specifications and standards may be downloaded from the following ASSIST websites:

(i) ASSIST (<http://assist.daps.dla.mil>).

(ii) Quick Search (<http://assist.daps.dla.mil/quicksearch>).

(iii) ASSISTdocs.com (<http://assistdocs.com>).

(3) Documents not available from ASSIST may be ordered from the Department of Defense Single Stock Point (DoDSSP) by--

(i) Using the ASSIST Shopping Wizard (<http://assist.daps.dla.mil/wizard>);

(ii) Phoning the DoDSSP Customer Service Desk (215) 697-2179, Mon-Fri, 0730 to 1600 EST; or

(iii) Ordering from DoDSSP, Building 4, Section D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Telephone (215) 697-2667/2179, Facsimile (215) 697-1462.

(4) Nongovernment (voluntary) standards must be obtained from the organization responsible for their preparation, publication, or maintenance.

(j) Data Universal Numbering System (DUNS) Number. (Applies to all offers exceeding \$3,000, and offers of \$3,000 or less if the solicitation requires the Contractor to be registered in the Central Contractor Registration (CCR) database. The offeror shall enter, in the block with its name and address on the cover page of its offer, the annotation "DUNS" or "DUNS +4" followed by the DUNS or DUNS +4 number that identifies the offeror's name and address. The DUNS +4 is the DUNS number plus a 4-character suffix that may be assigned at the discretion of the offeror to establish additional CCR records for identifying alternative Electronic Funds Transfer (EFT) accounts (see FAR Subpart 32.11) for the same concern. If the offeror does not have a DUNS number, it should contact Dun and Bradstreet directly to obtain one. An offeror within the United States may contact Dun and Bradstreet by calling 1-866-705-5711 or via the internet at <http://fedgov.dnb.com/webform>. An offeror located outside the United States must contact the local Dun and Bradstreet office for a DUNS number. The offeror should indicate that it is an offeror for a Government contract when contacting the local Dun and Bradstreet office.

(k) Central Contractor Registration. Unless exempted by an addendum to this solicitation, by submission of an offer, the offeror acknowledges the requirement that a prospective awardee shall be registered in the CCR database prior to award, during performance and through final payment of any contract resulting from this solicitation. If the Offeror does not become registered in the CCR database in the time prescribed by the Contracting Officer, the Contracting Officer will proceed to award to the next otherwise successful registered Offeror. Offerors may obtain information on registration and annual confirmation requirements via the Internet at <http://www.ccr.gov> or by calling 1-888-227-2423 or 269-961-5757.

(l) Debriefing. If a post-award debriefing is given to requesting offerors, the Government shall disclose the following information, if applicable:

(1) The agency's evaluation of the significant weak or deficient factors in the debriefed offeror's offer.

(2) The overall evaluated cost or price and technical rating of the successful and the debriefed offeror and past performance information on the debriefed offeror.

(3) The overall ranking of all offerors, when any ranking was developed by the agency during source selection.

(4) A summary of the rationale for award;

(5) For acquisitions of commercial items, the make and model of the item to be delivered by the successful offeror.

(6) Reasonable responses to relevant questions posed by the debriefed offeror as to whether source-selection procedures set forth in the solicitation, applicable regulations, and other applicable authorities were followed by the agency.

(End of provision)

#### 52.212-3 OFFEROR REPRESENTATIONS AND CERTIFICATIONS--COMMERCIAL ITEMS (JAN 2011)

An offeror shall complete only paragraph (b) of this provision if the offeror has completed the annual representations and certifications electronically at <http://orca.bpn.gov>. If an offeror has not completed the annual representations and certifications electronically at the ORCA website, the offeror shall complete only paragraphs (c) through (o) of this provision.

(a) Definitions. As used in this provision --

"Forced or indentured child labor" means all work or service-

(1) Exacted from any person under the age of 18 under the menace of any penalty for its nonperformance and for which the worker does not offer himself voluntarily; or

(2) Performed by any person under the age of 18 pursuant to a contract the enforcement of which can be accomplished by process or penalties.

Inverted domestic corporation means a foreign incorporated entity which is treated as an inverted domestic corporation under 6 U.S.C. 395(b), i.e., a corporation that used to be incorporated in the United States, or used to be a partnership in the United States, but now is incorporated in a foreign country, or is a subsidiary whose parent corporation is incorporated in a foreign country, that meets the criteria specified in 6 U.S.C. 395(b), applied in accordance with the rules and definitions of 6 U.S.C. 395(c).

Manufactured end product means any end product in Federal Supply Classes (FSC) 1000-9999, except--

(1) FSC 5510, Lumber and Related Basic Wood Materials;

(2) Federal Supply Group (FSG) 87, Agricultural Supplies;

(3) FSG 88, Live Animals;

(4) FSG 89, Food and Related Consumables;

(5) FSC 9410, Crude Grades of Plant Materials;

(6) FSC 9430, Miscellaneous Crude Animal Products, Inedible;

(7) FSC 9440, Miscellaneous Crude Agricultural and Forestry Products;

(8) FSC 9610, Ores;

(9) FSC 9620, Minerals, Natural and Synthetic; and

(10) FSC 9630, Additive Metal Materials.

Place of manufacture means the place where an end product is assembled out of components, or otherwise made or processed from raw materials into the finished product that is to be provided to the Government. If a product is disassembled and reassembled, the place of reassembly is not the place of manufacture.

Restricted business operations means business operations in Sudan that include power production activities, mineral extraction activities, oil-related activities, or the production of military equipment, as those terms are defined in the Sudan Accountability and Divestment Act of 2007 (Pub. L. 110-174). Restricted business operations do not include

business operations that the person (as that term is defined in Section 2 of the Sudan Accountability and Divestment Act of 2007) conducting the business can demonstrate--

- (1) Are conducted under contract directly and exclusively with the regional government of southern Sudan;
- (2) Are conducted pursuant to specific authorization from the Office of Foreign Assets Control in the Department of the Treasury, or are expressly exempted under Federal law from the requirement to be conducted under such authorization;
- (3) Consist of providing goods or services to marginalized populations of Sudan;
- (4) Consist of providing goods or services to an internationally recognized peacekeeping force or humanitarian organization;
- (5) Consist of providing goods or services that are used only to promote health or education; or
- (6) Have been voluntarily suspended.

Service-disabled veteran-owned small business concern--

(1) Means a small business concern--

- (i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and
- (ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a service-disabled veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

"Small business concern" means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria in 13 CFR Part 121 and size standards in this solicitation.

Veteran-owned small business concern means a small business concern--

- (1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and
- (2) The management and daily business operations of which are controlled by one or more veterans.

"Women-owned business concern" means a concern which is at least 51 percent owned by one or more women; or in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and whose management and daily business operations are controlled by one or more women.

"Women-owned small business concern" means a small business concern--

- (1) That is at least 51 percent owned by one or more women or, in the case of any publicly owned business, at least 51 percent of its stock is owned by one or more women; or
- (2) Whose management and daily business operations are controlled by one or more women.

(b) (1) Annual Representations and Certifications. Any changes provided by the offeror in paragraph (b)(2) of this provision do not automatically change the representations and certifications posted on the Online Representations and Certifications Application (ORCA) website.



(2) The offeror has completed the annual representations and certifications electronically via the ORCA website at <http://orca.bpn.gov>. After reviewing the ORCA database information, the offeror verifies by submission of this offer that the representations and certifications currently posted electronically at FAR 52.212-3, Offeror Representations and Certifications--Commercial Items, have been entered or updated in the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard applicable to the NAICS code referenced for this solicitation), as of the date of this offer and are incorporated in this offer by reference (see FAR 4.1201), except for paragraphs -----.

(Offeror to identify the applicable paragraphs at (c) through (o) of this provision that the offeror has completed for the purposes of this solicitation only, if any.)

These amended representation(s) and/or certification(s) are also incorporated in this offer and are current, accurate, and complete as of the date of this offer.

Any changes provided by the offeror are applicable to this solicitation only, and do not result in an update to the representations and certifications posted on ORCA.]

(c) Offerors must complete the following representations when the resulting contract will be performed in the United States or its outlying areas. Check all that apply.

(1) Small business concern. The offeror represents as part of its offer that it ( ) is, ( ) is not a small business concern.

(2) Veteran-owned small business concern. (Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a veteran-owned small business concern.

(3) Service-disabled veteran-owned small business concern. (Complete only if the offeror represented itself as a veteran-owned small business concern in paragraph (c)(2) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a service-disabled veteran-owned small business concern.

(4) Small disadvantaged business concern. (Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.) The offeror represents, for general statistical purposes, that it ( ) is, ( ) is not a small disadvantaged business concern as defined in 13 CFR 124.1002.

(5) Women-owned small business concern. (Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.) The offeror represents that it ( ) is, ( ) is not a women-owned small business concern.

Note: Complete paragraphs (c)(6) and (c)(7) only if this solicitation is expected to exceed the simplified acquisition threshold.

(6) Women-owned business concern (other than small business concern). (Complete only if the offeror is a women-owned business concern and did not represent itself as a small business concern in paragraph (c)(1) of this provision.) The offeror represents that it ( ) is, a women-owned business concern.

(7) Tie bid priority for labor surplus area concerns. If this is an invitation for bid, small business offerors may identify the labor surplus areas in which costs to be incurred on account of manufacturing or production (by offeror or first-tier subcontractors) amount to more than 50 percent of the contract price:

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(8) (Complete only if the solicitation contains the clause at FAR 52.219-23, Notice of Price Evaluation Adjustment for Small Disadvantaged Business Concerns or FAR 52.219-25, Small Disadvantaged Business Participation Program-Disadvantaged Status and Reporting, and the offeror desires a benefit based on its disadvantaged status.)

(i) General. The offeror represents that either--

(A) It ( ) is, ( ) is not certified by the Small Business Administration as a small disadvantaged business concern and identified, on the date of this representation, as a certified small disadvantaged business concern in the database maintained by the Small Business Administration (PRO-Net), and that no material change in disadvantaged ownership and control has occurred since its certification, and, where the concern is owned by one or more individuals claiming disadvantaged status, the net worth of each individual upon whom the certification is based does not exceed \$750,000 after taking into account the applicable exclusions set forth at 13 CFR 124.104(c)(2); or

(B) It ( ) has, ( ) has not submitted a completed application to the Small Business Administration or a Private Certifier to be certified as a small disadvantaged business concern in accordance with 13 CFR 124, Subpart B, and a decision on that application is pending, and that no material change in disadvantaged ownership and control has occurred since its application was submitted.

(ii) Joint Ventures under the Price Evaluation Adjustment for Small Disadvantaged Business Concerns. The offeror represents, as part of its offer, that it is a joint venture that complies with the requirements in 13 CFR 124.1002(f) and that the representation in paragraph (c)(9)(i) of this provision is accurate for the small disadvantaged business concern that is participating in the joint venture. (The offeror shall enter the name of the small disadvantaged business concern that is participating in the joint venture: \_\_\_\_\_.)

(9) HUBZone small business concern. (Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.) The offeror represents, as part of its offer, that--

(i) It [squ] is, [squ] is not a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration, and no material changes in ownership and control, principal office, or HUBZone employee percentage have occurred since it was certified in accordance with 13 CFR Part 126; and

(ii) It [squ] is, [squ] is not a HUBZone joint venture that complies with the requirements of 13 CFR Part 126, and the representation in paragraph (c)(10)(i) of this provision is accurate for each HUBZone small business concern participating in the HUBZone joint venture. [The offeror shall enter the names of each of the HUBZone small business concerns participating in the HUBZone joint venture: -----.] Each HUBZone small business concern participating in the HUBZone joint venture shall submit a separate signed copy of the HUBZone representation.

(d) Certifications and representations required to implement provisions of Executive Order 11246--

(1) Previous Contracts and Compliance. The offeror represents that--

(i) It ( ) has, ( ) has not, participated in a previous contract or subcontract subject either to the Equal Opportunity clause of this solicitation, the and

(ii) It ( ) has, ( ) has not, filed all required compliance reports.

(2) Affirmative Action Compliance. The offeror represents that--

(i) It ( ) has developed and has on file, ( ) has not developed and does not have on file, at each establishment, affirmative action programs required by rules and regulations of the Secretary of Labor (41 CFR Subparts 60-1 and 60-2), or

(ii) It ( ) has not previously had contracts subject to the written affirmative action programs requirement of the rules and regulations of the Secretary of Labor.

(e) Certification Regarding Payments to Influence Federal Transactions (31 U.S.C. 1352). (Applies only if the contract is expected to exceed \$150,000.) By submission of its offer, the offeror certifies to the best of its knowledge and belief that no Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress or an employee of a Member of Congress on his or her behalf in connection with the award of any resultant contract. If any registrants under the Lobbying Disclosure Act of 1995 have made a lobbying contact on behalf of the offeror with respect to this contract, the offeror shall complete and submit, with its offer, OMB Standard Form LLL, Disclosure of Lobbying Activities, to provide the name of the registrants. The offeror need not

report regularly employed officers or employees of the offeror to whom payments of reasonable compensation were made.

(f) Buy American Act Certificate. (Applies only if the clause at Federal Acquisition Regulation (FAR) 52.225-1, Buy American Act --Supplies, is included in this solicitation.)

(1) The offeror certifies that each end product, except those listed in paragraph (f)(2) of this provision, is a domestic end product and that for other than COTS items, the offeror has considered components of unknown origin to have been mined, produced, or manufactured outside the United States. The offeror shall list as foreign end products those end products manufactured in the United States that do not qualify as domestic end products, i.e., an end product that is not a COTS item and does not meet the component test in paragraph (2) of the definition of "domestic end product." The terms "commercially available off-the-shelf (COTS) item," "component," "domestic end product," "end product," "foreign end product," and "United States" are defined in the clause of this solicitation entitled "Buy American Act--Supplies."

(2) Foreign End Products:

Line Item No.:-----

Country of Origin:-----

(List as necessary)

(3) The Government will evaluate offers in accordance with the policies and procedures of FAR Part 25.

(g)(1) *Buy American Act-Free Trade Agreements-Israeli Trade Act Certificate*. (Applies only if the clause at FAR 52.225-3, Buy American Act-Free Trade Agreements-Israeli Trade Act, is included in this solicitation.)

(i) The offeror certifies that each end product, except those listed in paragraph (g)(1)(ii) or (g)(1)(iii) of this provision, is a domestic end product and that for other than COTS items, the offeror has considered components of unknown origin to have been mined, produced, or manufactured outside the United States. The terms "Bahrainian, Moroccan, Omani, or Peruvian end product," "commercially available off-the-shelf (COTS) item," "component," "domestic end product," "end product," "foreign end product," "Free Trade Agreement country," "Free Trade Agreement country end product," "Israeli end product," and "United States" are defined in the clause of this solicitation entitled "Buy American Act-Free Trade Agreements-Israeli Trade Act."

(ii) The offeror certifies that the following supplies are Free Trade Agreement country end products (other than Bahrainian, Moroccan, Omani, or Peruvian end products) or Israeli end products as defined in the clause of this solicitation entitled "Buy American Act-Free Trade Agreements--Israeli Trade Act":

Free Trade Agreement Country End Products (Other than Bahrainian, Moroccan, Omani, or Peruvian End Products) or Israeli End Products:

Line Item No.

-----  
-----  
-----

[List as necessary]

(iii) The offeror shall list those supplies that are foreign end products (other than those listed in paragraph (g)(1)(ii) of this provision) as defined in the clause of this solicitation entitled "Buy American Act-Free Trade Agreements-Israeli Trade Act." The offeror shall list as other foreign end products those end products manufactured in the United States that do not qualify as domestic end products, i.e., an end product that is not a COTS item and does not meet the component test in paragraph (2) of the definition of "domestic end product."

Other Foreign End Products:

Line Item No.	Country of Origin
_____	_____
_____	_____
_____	_____

[List as necessary]

(iv) The Government will evaluate offers in accordance with the policies and procedures of FAR Part 25.

(2) *Buy American Act-Free Trade Agreements-Israeli Trade Act Certificate, Alternate I (Jan 2004)*. If Alternate I to the clause at FAR 52.225-3 is included in this solicitation, substitute the following paragraph (g)(1)(ii) for paragraph (g)(1)(ii) of the basic provision:

(g)(1)(ii) The offeror certifies that the following supplies are Canadian end products as defined in the clause of this solicitation entitled "Buy American Act-Free Trade Agreements-Israeli Trade Act":

Canadian End Products:

Line Item No.
_____
_____
_____

[List as necessary]

(3) *Buy American Act-Free Trade Agreements-Israeli Trade Act Certificate, Alternate II (Jan 2004)*. If Alternate II to the clause at FAR 52.225-3 is included in this solicitation, substitute the following paragraph (g)(1)(ii) for paragraph (g)(1)(ii) of the basic provision:

(g)(1)(ii) The offeror certifies that the following supplies are Canadian end products or Israeli end products as defined in the clause of this solicitation entitled "Buy American Act-Free Trade Agreements-Israeli Trade Act":

Canadian or Israeli End Products:

Line Item No.	Country of Origin
_____	_____
_____	_____
_____	_____

[List as necessary]

(4) Trade Agreements Certificate. (Applies only if the clause at FAR 52.225-5, Trade Agreements, is included in this solicitation.)

(i) The offeror certifies that each end product, except those listed in paragraph (g)(4)(ii) of this provision, is a U.S.-made or designated country end product, as defined in the clause of this solicitation entitled "Trade Agreements."

(ii) The offeror shall list as other end products those end products that are not U.S.-made or designated country end products.

Other End Products:

Line Item No.	Country of Origin
_____	_____
_____	_____
_____	_____

(List as necessary)

(iii) The Government will evaluate offers in accordance with the policies and procedures of FAR Part 25. For line items covered by the WTO GPA, the Government will evaluate offers of U.S.-made or designated country end products without regard to the restrictions of the Buy American Act. The Government will consider for award only offers of U.S.-made or designated country end products unless the Contracting Officer determines that there are no offers for such products or that the offers for such products are insufficient to fulfill the requirements of the solicitation.

(h) Certification Regarding Responsibility Matters (Executive Order 12689). The offeror certifies, to the best of its knowledge and belief, that --

(1) The offeror and/or any of its principals ( ) are, ( ) are not presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency,

(2) ( ) Have, ( ) have not, within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a Federal, state or local government contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating Federal criminal tax laws, or receiving stolen property; and

(3) ( ) are, ( ) are not presently indicted for, or otherwise criminally or civilly charged by a Government entity with, commission of any of these offenses enumerated in paragraph (h)(2) of this clause; and

(4) ( ) Have, ( ) have not, within a three-year period preceding this offer, been notified of any delinquent Federal taxes in an amount that exceeds \$3,000 for which the liability remains unsatisfied.

(i) Taxes are considered delinquent if both of the following criteria apply:

(A) The tax liability is finally determined. The liability is finally determined if it has been assessed. A liability is not finally determined if there is a pending administrative or judicial challenge. In the case of a judicial challenge to the liability, the liability is not finally determined until all judicial appeal rights have been exhausted.

(B) The taxpayer is delinquent in making payment. A taxpayer is delinquent if the taxpayer has failed to pay the tax liability when full payment was due and required. A taxpayer is not delinquent in cases where enforced collection action is precluded.

(ii) Examples.

(A) The taxpayer has received a statutory notice of deficiency, under I.R.C. Sec. 6212, which entitles the taxpayer to seek Tax Court review of a proposed tax deficiency. This is not a delinquent tax because it is not a final tax liability. Should the taxpayer seek Tax Court review, this will not be a final tax liability until the taxpayer has exercised all judicial appeal rights.

(B) The IRS has filed a notice of Federal tax lien with respect to an assessed tax liability, and the taxpayer has been issued a notice under I.R.C. Sec. 6320 entitling the taxpayer to request a hearing with the IRS Office of Appeals contesting the lien filing, and to further appeal to the Tax Court if the IRS determines to sustain the lien filing. In the course of the hearing, the taxpayer is entitled to contest the underlying tax liability because the taxpayer has had no prior opportunity to contest the liability. This is not a delinquent tax because it is not a final tax liability. Should the taxpayer seek tax court review, this will not be a final tax liability until the taxpayer has exercised all judicial appeal rights.

(C) The taxpayer has entered into an installment agreement pursuant to I.R.C. Sec. 6159. The taxpayer is making timely payments and is in full compliance with the agreement terms. The taxpayer is not delinquent because the taxpayer is not currently required to make full payment.

(D) The taxpayer has filed for bankruptcy protection. The taxpayer is not delinquent because enforced collection action is stayed under 11 U.S.C. 362 (the Bankruptcy Code).

---

(i) Certification Regarding Knowledge of Child Labor for Listed End Products (Executive Order 13126).

N/A

(2) Certification.

N/A

(j) Place of manufacture. (Does not apply unless the solicitation is predominantly for the acquisition of manufactured end products.) For statistical purposes only, the offeror shall indicate whether the place of manufacture of the end products it expects to provide in response to this solicitation is predominantly--

(1) ☐ In the United States (Check this box if the total anticipated price of offered end products manufactured in the United States exceeds the total anticipated price of offered end products manufactured outside the United States); or

(2) ☐ Outside the United States.

(k) Certificates regarding exemptions from the application of the Service Contract Act. (Certification by the offeror as to its compliance with respect to the contract also constitutes its certification as to compliance by its subcontractor if it subcontracts out the exempt services.)

NOT APPLICABLE.

(The contracting officer is to check a box to indicate if paragraph (k)(1) or (k)(2) applies.)

☐ (1) Maintenance, calibration, or repair of certain equipment as described in FAR 22.1003-4(c)(1). The offeror ☐ does ☐ does not certify that--

(i) The items of equipment to be serviced under this contract are used regularly for other than Governmental purposes and are sold or traded by the offeror in substantial quantities to the general public in the course of normal business operations;

(ii) The services will be furnished at prices which are, or are based on, established catalog or market prices (see FAR 22.1003-4(c)(2)(ii)) for the maintenance, calibration, or repair of such equipment; and

(iii) The compensation (wage and fringe benefits) plan for all service employees performing work under the contract will be the same as that used for these employees and equivalent employees servicing the same equipment of commercial customers.

☐ (2) Certain services as described in FAR 22.1003-4(d)(1). The offeror ☐ does ☐ does not certify that--

(i) The services under the contract are offered and sold regularly to non-Governmental customers, and are provided by the offeror (or subcontractor in the case of an exempt subcontract) to the general public in substantial quantities in the course of normal business operations;

(ii) The contract services will be furnished at prices that are, or are based on, established catalog or market prices (see FAR 22.1003-4(d)(2)(iii));

(iii) Each service employee who will perform the services under the contract will spend only a small portion of his or her time (a monthly average of less than 20 percent of the available hours on an annualized basis, or less than 20 percent of available hours during the contract period if the contract period is less than a month) servicing the Government contract; and

(iv) The compensation (wage and fringe benefits) plan for all service employees performing work under the contract is the same as that used for these employees and equivalent employees servicing commercial customers.

(3) If paragraph (k)(1) or (k)(2) of this clause applies--

(i) If the offeror does not certify to the conditions in paragraph (k)(1) or (k)(2) and the Contracting Officer did not attach a Service Contract Act wage determination to the solicitation, the offeror shall notify the Contracting Officer as soon as possible; and

(ii) The Contracting Officer may not make an award to the offeror if the offeror fails to execute the certification in paragraph (k)(1) or (k)(2) of this clause or to contact the Contracting Officer as required in paragraph (k)(3)(i) of this clause.

(l) Taxpayer Identification Number (TIN) (26 U.S.C. 6109, 31 U.S.C. 7701). (Not applicable if the offeror is required to provide this information to a central contractor registration database to be eligible for award.)

(1) All offerors must submit the information required in paragraphs (l)(3) through (l)(5) of this provision to comply with debt collection requirements of 31 U.S.C. 7701(c) and 3325(d), reporting requirements of 26 U.S.C. 6041, 6041A, and 6050M, and implementing regulations issued by the Internal Revenue Service (IRS).

(2) The TIN may be used by the Government to collect and report on any delinquent amounts arising out of the offeror's relationship with the Government (31 U.S.C. 7701(c)(3)). If the resulting contract is subject to the payment reporting requirements described in FAR 4.904, the TIN provided hereunder may be matched with IRS records to verify the accuracy of the offeror's TIN.

(3) Taxpayer Identification Number (TIN).

( ) TIN: -----.

( ) TIN has been applied for.

( ) TIN is not required because:

( ) Offeror is a nonresident alien, foreign corporation, or foreign partnership that does not have income effectively connected with the conduct of a trade or business in the United States and does not have an office or place of business or a fiscal paying agent in the United States;

( ) Offeror is an agency or instrumentality of a foreign government;

( ) Offeror is an agency or instrumentality of the Federal Government.

(4) Type of organization.

( ) Sole proprietorship;

( ) Partnership;

( ) Corporate entity (not tax-exempt);

( ) Corporate entity (tax-exempt);

( ) Government entity (Federal, State, or local);

( ) Foreign government;

( ) International organization per 26 CFR 1.6049-4;

( ) Other -----.

(5) Common parent.

( ) Offeror is not owned or controlled by a common parent;

( ) Name and TIN of common parent:

Name -----.

TIN -----.

(m) Restricted business operations in Sudan. By submission of its offer, the offeror certifies that the offeror does not conduct any restricted business operations in Sudan.

(n) Prohibition on Contracting with Inverted Domestic Corporations.

(1) Relation to Internal Revenue Code. A foreign entity that is treated as an inverted domestic corporation for purposes of the Internal Revenue Code at 26 U.S.C. 7874 (or would be except that the inversion transactions were completed on or before March 4, 2003), is also an inverted domestic corporation for purposes of 6 U.S.C. 395 and for this solicitation provision (see FAR 9.108).

(2) Representation. By submission of its offer, the offeror represents that it is not an inverted domestic corporation and is not a subsidiary of one.

(o) Sanctioned activities relating to Iran.

(1) Unless a waiver is granted or an exception applies as provided in paragraph (o)(2) of this provision, by submission of its offer, the offeror certifies that the offeror, or any person owned or controlled by the offeror, does not engage in any activities for which sanctions may be imposed under section 5 of the Iran Sanctions Act of 1996.

(2) The certification requirement of paragraph (o)(1) of this provision does not apply if—

(i) This solicitation includes a trade agreements certification (e.g., 52.212-3(g) or a comparable agency provision); and

(ii) The offeror has certified that all the offered products to be supplied are designated country end products.

(End of provision)

#### 52.212-4 CONTRACT TERMS AND CONDITIONS-- COMMERCIAL ITEMS (JUN 2010)

(a) Inspection/Acceptance. The Contractor shall only tender for acceptance those items that conform to the requirements of this contract. The Government reserves the right to inspect or test any supplies or services that have been tendered for acceptance. The Government may require repair or replacement of nonconforming supplies or reperformance of nonconforming services at no increase in contract price. If repair/replacement or reperformance will not correct the defects or is not possible, the Government may seek an equitable price reduction or adequate consideration for acceptance of nonconforming supplies or services. The Government must exercise its post-acceptance rights (1) within a reasonable time after the defect was discovered or should have been discovered; and (2) before any substantial change occurs in the condition of the item, unless the change is due to the defect in the item.

(b) Assignment. The Contractor or its assignee may assign its rights to receive payment due as a result of performance of this contract to a bank, trust company, or other financing institution, including any Federal lending



agency in accordance with the Assignment of Claims Act (31 U.S.C. 3727). However, when a third party makes payment (e.g., use of the Governmentwide commercial purchase card), the Contractor may not assign its rights to receive payment under this contract.

(c) Changes. Changes in the terms and conditions of this contract may be made only by written agreement of the parties.

(d) Disputes. This contract is subject to the Contract Disputes Act of 1978, as amended (41 U.S.C. 601-613). Failure of the parties to this contract to reach agreement on any request for equitable adjustment, claim, appeal or action arising under or relating to this contract shall be a dispute to be resolved in accordance with the clause at FAR 52.233-1, Disputes, which is incorporated herein by reference. The Contractor shall proceed diligently with performance of this contract, pending final resolution of any dispute arising under the contract.

(e) Definitions. The clause at FAR 52.202-1, Definitions, is incorporated herein by reference.

(f) Excusable delays. The Contractor shall be liable for default unless nonperformance is caused by an occurrence beyond the reasonable control of the Contractor and without its fault or negligence such as, acts of God or the public enemy, acts of the Government in either its sovereign or contractual capacity, fires, floods, epidemics, quarantine restrictions, strikes, unusually severe weather, and delays of common carriers. The Contractor shall notify the Contracting Officer in writing as soon as it is reasonably possible after the commencement or any excusable delay, setting forth the full particulars in connection therewith, shall remedy such occurrence with all reasonable dispatch and shall promptly give written notice to the Contracting Officer of the cessation of such occurrence.

(g) Invoice.

(1) The Contractor shall submit an original invoice and three copies (or electronic invoice, if authorized) to the address designated in the contract to receive invoices. An invoice must include--

(i) Name and address of the Contractor;

(ii) Invoice date and number;

(iii) Contract number, contract line item number and, if applicable, the order number;

(iv) Description, quantity, unit of measure, unit price and extended price of the items delivered;

(v) Shipping number and date of shipment, including the bill of lading number and weight of shipment if shipped on Government bill of lading;

(vi) Terms of any discount for prompt payment offered;

(vii) Name and address of official to whom payment is to be sent;

(viii) Name, title, and phone number of person to notify in event of defective invoice; and

(ix) Taxpayer Identification Number (TIN). The Contractor shall include its TIN on the invoice only if required elsewhere in this contract.

(x) Electronic funds transfer (EFT) banking information.

(A) The Contractor shall include EFT banking information on the invoice only if required elsewhere in this contract.

(B) If EFT banking information is not required to be on the invoice, in order for the invoice to be a proper invoice, the Contractor shall have submitted correct EFT banking information in accordance with the applicable solicitation provision, contract clause (e.g., 52.232-33, Payment by Electronic Funds Transfer--Central Contractor Registration, or 52.232-34, Payment by Electronic Funds Transfer--Other Than Central Contractor Registration), or applicable agency procedures.

(C) EFT banking information is not required if the Government waived the requirement to pay by EFT.

(2) Invoices will be handled in accordance with the Prompt Payment Act (31 U.S.C. 3903) and Office of Management and Budget (OMB) prompt payment regulations at 5 CFR part 1315.

(h) Patent indemnity. The Contractor shall indemnify the Government and its officers, employees and agents against liability, including costs, for actual or alleged direct or contributory infringement of, or inducement to infringe, any United States or foreign patent, trademark or copyright, arising out of the performance of this contract, provided the Contractor is reasonably notified of such claims and proceedings.

(i) Payment.--

(1) Items accepted. Payment shall be made for items accepted by the Government that have been delivered to the delivery destinations set forth in this contract.

(2) Prompt payment. The Government will make payment in accordance with the Prompt Payment Act (31 U.S.C. 3903) and prompt payment regulations at 5 CFR part 1315.

(3) Electronic Funds Transfer (EFT). If the Government makes payment by EFT, see 52.212-5(b) for the appropriate EFT clause.

(4) Discount. In connection with any discount offered for early payment, time shall be computed from the date of the invoice. For the purpose of computing the discount earned, payment shall be considered to have been made on the date which appears on the payment check or the specified payment date if an electronic funds transfer payment is made.

(5) Overpayments. If the Contractor becomes aware of a duplicate contract financing or invoice payment or that the Government has otherwise overpaid on a contract financing or invoice payment, the Contractor shall--

(i) Remit the overpayment amount to the payment office cited in the contract along with a description of the overpayment including the--

(A) Circumstances of the overpayment (e.g., duplicate payment, erroneous payment, liquidation errors, date(s) of overpayment);

(B) Affected contract number and delivery order number, if applicable;

(C) Affected contract line item or subline item, if applicable; and

(D) Contractor point of contact.

(ii) Provide a copy of the remittance and supporting documentation to the Contracting Officer.

(6) Interest.

(i) All amounts that become payable by the Contractor to the Government under this contract shall bear simple interest from the date due until paid unless paid within 30 days of becoming due. The interest rate shall be the interest rate established by the Secretary of the Treasury as provided in Section 611 of the Contract Disputes Act of 1978 (Public Law 95-563), which is applicable to the period in which the amount becomes due, as provided in (i)(6)(v) of this clause, and then at the rate applicable for each six-month period as fixed by the Secretary until the amount is paid.

(ii) The Government may issue a demand for payment to the Contractor upon finding a debt is due under the contract.

(iii) Final decisions. The Contracting Officer will issue a final decision as required by 33.211 if--

(A) The Contracting Officer and the Contractor are unable to reach agreement on the existence or amount of a debt within 30 days;

(B) The Contractor fails to liquidate a debt previously demanded by the Contracting Officer within the timeline specified in the demand for payment unless the amounts were not repaid because the Contractor has requested an installment payment agreement; or

(C) The Contractor requests a deferment of collection on a debt previously demanded by the Contracting Officer (see 32.607-2).

(iv) If a demand for payment was previously issued for the debt, the demand for payment included in the final decision shall identify the same due date as the original demand for payment.

(v) Amounts shall be due at the earliest of the following dates:

(A) The date fixed under this contract.

(B) The date of the first written demand for payment, including any demand for payment resulting from a default termination.

(vi) The interest charge shall be computed for the actual number of calendar days involved beginning on the due date and ending on--

(A) The date on which the designated office receives payment from the Contractor;

(B) The date of issuance of a Government check to the Contractor from which an amount otherwise payable has been withheld as a credit against the contract debt; or

(C) The date on which an amount withheld and applied to the contract debt would otherwise have become payable to the Contractor.

(vii) The interest charge made under this clause may be reduced under the procedures prescribed in 32.608-2 of the Federal Acquisition Regulation in effect on the date of this contract.

(j) Risk of loss. Unless the contract specifically provides otherwise, risk of loss or damage to the supplies provided under this contract shall remain with the Contractor until, and shall pass to the Government upon:

(1) Delivery of the supplies to a carrier, if transportation is f.o.b. origin; or

(2) Delivery of the supplies to the Government at the destination specified in the contract, if transportation is f.o.b. destination.

(k) Taxes. The contract price includes all applicable Federal, State, and local taxes and duties.

(l) Termination for the Government's convenience. The Government reserves the right to terminate this contract, or any part hereof, for its sole convenience. In the event of such termination, the Contractor shall immediately stop all work hereunder and shall immediately cause any and all of its suppliers and subcontractors to cease work. Subject to the terms of this contract, the Contractor shall be paid a percentage of the contract price reflecting the percentage of the work performed prior to the notice of termination, plus reasonable charges the Contractor can demonstrate to the satisfaction of the Government using its standard record keeping system, have resulted from the termination. The Contractor shall not be required to comply with the cost accounting standards or contract cost principles for this purpose. This paragraph does not give the Government any right to audit the Contractor's records. The Contractor shall not be paid for any work performed or costs incurred which reasonably could have been avoided.

(m) Termination for cause. The Government may terminate this contract, or any part hereof, for cause in the event of any default by the Contractor, or if the Contractor fails to comply with any contract terms and conditions, or fails to provide the Government, upon request, with adequate assurances of future performance. In the event of termination for cause, the Government shall not be liable to the Contractor for any amount for supplies or services not accepted, and the Contractor shall be liable to the Government for any and all rights and remedies provided by law. If it is determined that the Government improperly terminated this contract for default, such termination shall be deemed a termination for convenience.

(n) Title. Unless specified elsewhere in this contract, title to items furnished under this contract shall pass to the Government upon acceptance, regardless of when or where the Government takes physical possession.

(o) Warranty. The Contractor warrants and implies that the items delivered hereunder are merchantable and fit for use for the particular purpose described in this contract.

(p) Limitation of liability. Except as otherwise provided by an express warranty, the Contractor will not be liable to the Government for consequential damages resulting from any defect or deficiencies in accepted items.

(q) Other compliances. The Contractor shall comply with all applicable Federal, State and local laws, executive orders, rules and regulations applicable to its performance under this contract.

(r) Compliance with laws unique to Government contracts. The Contractor agrees to comply with 31 U.S.C. 1352 relating to limitations on the use of appropriated funds to influence certain Federal contracts; 18 U.S.C. 431 relating to officials not to benefit; 40 U.S.C. 3701, et seq., Contract Work Hours and Safety Standards Act; 41 U.S.C. 51-58, Anti-Kickback Act of 1986; 41 U.S.C. 265 and 10 U.S.C. 2409 relating to whistleblower protections; 49 U.S.C. 40118, Fly American; and 41 U.S.C. 423 relating to procurement integrity.

(s) Order of precedence. Any inconsistencies in this solicitation or contract shall be resolved by giving precedence in the following order: (1) the schedule of supplies/services; (2) the Assignments, Disputes, Payments, Invoice, Other Compliances, and Compliance with Laws Unique to Government Contracts paragraphs of this clause; (3) the clause at 52.212-5; (4) addenda to this solicitation or contract, including any license agreements for computer software; (5) solicitation provisions if this is a solicitation; (6) other paragraphs of this clause; (7) the Standard Form 1449; (8) other documents, exhibits, and attachments; and (9) the specification.

(t) Central Contractor Registration (CCR). (1) Unless exempted by an addendum to this contract, the Contractor is responsible during performance and through final payment of any contract for the accuracy and completeness of the data within the CCR database, and for any liability resulting from the Government's reliance on inaccurate or incomplete data. To remain registered in the CCR database after the initial registration, the Contractor is required to review and update on an annual basis from the date of initial registration or subsequent updates its information in the CCR database to ensure it is current, accurate and complete. Updating information in the CCR does not alter the terms and conditions of this contract and is not a substitute for a properly executed contractual document.

(2)(i) If a Contractor has legally changed its business name, "doing business as" name, or division name (whichever is shown on the contract), or has transferred the assets used in performing the contract, but has not completed the necessary requirements regarding novation and change-of-name agreements in FAR subpart 42.12, the Contractor shall provide the responsible Contracting Officer a minimum of one business day's written notification of its intention to (A) change the name in the CCR database; (B) comply with the requirements of subpart 42.12; and (C) agree in writing to the timeline and procedures specified by the responsible Contracting Officer. The Contractor must provide with the notification sufficient documentation to support the legally changed name.

(ii) If the Contractor fails to comply with the requirements of paragraph (t)(2)(i) of this clause, or fails to perform the agreement at paragraph (t)(2)(i)(C) of this clause, and, in the absence of a properly executed novation or change-of-name agreement, the CCR information that shows the Contractor to be other than the Contractor indicated in the contract will be considered to be incorrect information within the meaning of the "Suspension of Payment" paragraph of the electronic funds transfer (EFT) clause of this contract.

(3) The Contractor shall not change the name or address for EFT payments or manual payments, as appropriate, in the CCR record to reflect an assignee for the purpose of assignment of claims (see Subpart 32.8, Assignment of Claims). Assignees shall be separately registered in the CCR database. Information provided to the Contractor's CCR record that indicates payments, including those made by EFT, to an ultimate recipient other than that Contractor will be considered to be incorrect information within the meaning of the "Suspension of payment" paragraph of the EFT clause of this contract.

(4) Offerors and Contractors may obtain information on registration and annual confirmation requirements via the internet at <http://www.ccr.gov> or by calling 1-888-227-2423 or 269-961-5757.

(End of clause)

52.212-5 CONTRACT TERMS AND CONDITIONS REQUIRED TO IMPLEMENT STATUTES OR EXECUTIVE ORDERS--COMMERCIAL ITEMS (JAN 2011)

(a) The Contractor shall comply with the following Federal Acquisition Regulation (FAR) clauses, which are incorporated in this contract by reference, to implement provisions of law or Executive orders applicable to acquisitions of commercial items:

(1) 52.222-50, Combating Trafficking in Persons (FEB 2009) (22 U.S.C. 7104(g)).

Alternate I (Aug 2007) of 52.222-50 (22 U.S.C. 7104(g)).

(2) 52.233-3, Protest After Award (AUG 1996) (31 U.S.C. 3553).

(3) 52.233-4, Applicable Law for Breach of Contract Claim (OCT 2004) (Pub. L. 108-77, 108-78).

(b) The Contractor shall comply with the FAR clauses in this paragraph (b) that the Contracting Officer has indicated as being incorporated in this contract by reference to implement provisions of law or Executive orders applicable to acquisitions of commercial items: (Contracting Officer check as appropriate.)

☒ (1) 52.203-6, Restrictions on Subcontractor Sales to the Government (SEP 2006), with Alternate I (OCT 1995) (41 U.S.C. 253g and 10 U.S.C. 2402).

☐ (2) 52.203-13, Contractor Code of Business Ethics and Conduct (APR 2010)(Pub. L. 110-252, Title VI, Chapter 1 (41 U.S.C. 251 note)).

☐ (3) 52.203-15, Whistleblower Protections under the American Recovery and Reinvestment Act of 2009 (JUN 2010) (Section 1553 of Pub. L. 111-5). (Applies to contracts funded by the American Recovery and Reinvestment Act of 2009.)

☒ (4) 52.204-10, Reporting Executive Compensation and First-Tier Subcontract Awards (JUL 2010) (Pub. L. 109-282) (31 U.S.C. 6101 note).

☐ (5) 52.204-11, American Recovery and Reinvestment Act—Reporting Requirements (JUL 2010) (Pub. L. 111-5).

☒ (6) 52.209-6, Protecting the Government's Interest When Subcontracting with Contractors Debarred, Suspended, or Proposed for Debarment (DEC 2010) (31 U.S.C. 6101 note). (Applies to contracts over \$30,000). (Not applicable to subcontracts for the acquisition of commercially available off-the-shelf items).

☐ (7) 52.219-3, Notice of Total HUBZone Set-Aside or Sole-Source Award (JAN 2011) (15 U.S.C. 657a).

☐ (8) 52.219-4, Notice of Price Evaluation Preference for HUBZone Small Business Concerns (JAN 2011) (if the offeror elects to waive the preference, it shall so indicate in its offer) (15 U.S.C. 657a).

☐ (9) [Reserved].

☐ (10)(i) 52.219-6, Notice of Total Small Business Set-Aside (JUNE 2003) (15 U.S.C. 644).

☐ (ii) Alternate I (OCT 1995) of 52.219-6.

☐ (iii) Alternate II (MAR 2004) of 52.219-6.

- \_\_\_ (11)(i) 52.219-7, Notice of Partial Small Business Set-Aside (JUNE 2003) (15 U.S.C. 644).
- \_\_\_ (ii) Alternate I (OCT 1995) of 52.219-7.
- \_\_\_ (iii) Alternate II (MAR 2004) of 52.219-7.
- \_\_\_ (12) 52.219-8, Utilization of Small Business Concerns (JAN 2011) (15 U.S.C. 637 (d)(2) and (3)).
- \_\_\_ (13)(i) 52.219-9, Small Business Subcontracting Plan (JAN 2011) (15 U.S.C. 637(d)(4)).
- \_\_\_ (ii) Alternate I (OCT 2001) of 52.219-9
- \_\_\_ (iii) Alternate II (OCT 2001) of 52.219-9.
- \_\_\_ (iv) Alternate III (JUL 2010) of 52.219-9.
- \_\_\_ (14) 52.219-14, Limitations on Subcontracting (DEC 1996) (15 U.S.C. 637(a)(14)).
- \_\_\_ (15) 52.219-16, Liquidated Damages--Subcontracting Plan (JAN 1999) (15 U.S.C. 637(d)(4)(F)(i)).
- \_\_\_ (16)(i) 52.219-23, Notice of Price Evaluation Adjustment for Small Disadvantaged Business Concerns (OCT 2008) (10 U.S.C. 2323) (if the offeror elects to waive the adjustment, it shall so indicate in its offer).
- \_\_\_ (ii) Alternate I (JUNE 2003) of 52.219-23.
- \_\_\_ (17) 52.219-25, Small Disadvantaged Business Participation Program--Disadvantaged Status and Reporting (APR 2008) (Pub. L. 103-355, section 7102, and 10 U.S.C. 2323).
- \_\_\_ (18) 52.219-26, Small Disadvantaged Business Participation Program--Incentive Subcontracting (OCT 2000) (Pub. L. 103-355, section 7102, and 10 U.S.C. 2323).
- \_\_\_ (19) 52.219-27, Notice of Total Service-Disabled Veteran-Owned Small Business Set-Aside (MAY 2004) (U.S.C. 657 f).
- \_\_\_ (20) 52.219-28, Post Award Small Business Program Rerepresentation (APR 2009) (15 U.S.C. 632(a)(2)).
- \_\_\_ (21) 52.222-3, Convict Labor (JUNE 2003) (E.O. 11755).
- \_\_X\_ (22) 52.222-19, Child Labor--Cooperation with Authorities and Remedies (JUL 2010) (E.O. 13126).
- \_\_X\_ (23) 52.222-21, Prohibition of Segregated Facilities (FEB 1999).
- \_\_X\_ (24) 52.222-26, Equal Opportunity (MAR 2007) (E.O. 11246).
- \_\_\_ (25) 52.222-35, Equal Opportunity for Veterans (SEP 2010) (38 U.S.C. 4212).

\_\_\_ (26) 52.222-36, Affirmative Action for Workers with Disabilities (OCT 2010) (29 U.S.C. 793).

\_\_\_ (27) 52.222-40, Notification of Employee Rights Under the National Labor Relations Act (DEC 2010) (E.O. 13496).

\_\_\_ (28) 52.222-37, Employment Reports on Veterans (SEP 2010) (38 U.S.C. 4212).

\_\_\_ (29) 52.222-54, Employment Eligibility Verification (JAN 2009). (Executive Order 12989). (Not applicable to the acquisition of commercially available off-the-shelf items or certain other types of commercial items as prescribed in 22.1803.)

\_\_\_ (30) (i) 52.223-9, Estimate of Percentage of Recovered Material Content for EPA-Designated Items (MAY 2008) (42 U.S.C. 6962(c)(3)(A)(ii)). (Not applicable to the acquisition of commercially available off-the-shelf items.)

\_\_\_ (ii) Alternate I (MAY 2008) of 52.223-9 (42 U.S.C. 6962(i)(2)(c)). (Not applicable to the acquisition of commercially available off-the-shelf items.)

\_\_\_ (31) 52.223-15, Energy Efficiency in Energy-Consuming Products (DEC 2007) (42 U.S.C. 8259b)

\_\_\_ (32)(i) 52.223-16, IEEE 1680 Standard for the Environmental Assessment of Personal Computer Products (DEC 2007) (E.O. 13423) .

\_\_\_ (ii) Alternate I (DEC 2007) of 52.223-16. .

\_\_\_ (33) 52.223-18, Contractor Policy to Ban Text Messaging while Driving (SEP 2010) (E.O. 13513).

\_\_\_ (34) 52.225-1, Buy American Act--Supplies (JUNE 2003) (41 U.S.C. 10a-10d).

\_\_\_ (35)(i) 52.225-3, Buy American Act--Free Trade Agreements--Israeli Trade Act (JUN 2009) (41 U.S.C. 10a-10d, 19 U.S.C. 3301 note, 19 U.S.C. 2112 note, 19 U.S.C. 3805 note, Pub. L. 108-77, 108-78, 108-286, 108-302, 109-53, 109-169, 109-283, and 110-138).

\_\_\_ (ii) Alternate I (JAN 2004) of 52.225-3.

\_\_\_ (iii) Alternate II (JAN 2004) of 52.225-3.

\_\_\_ (36) 52.225-5, Trade Agreements (AUG 2009) (19 U.S.C. 2501, et seq., 19 U.S.C. 3301 note).

\_\_X\_ (37) 52.225-13, Restrictions on Certain Foreign Purchases (JUN 2008) (E.O.'s, proclamations, and statutes administered by the Office of Foreign Assets Control of the Department of the Treasury).

\_\_\_ (38) 52.226-4, Notice of Disaster or Emergency Area Set-Aside (Nov 2007) (42 U.S.C. 5150).

\_\_\_ (39) 52.226-5, Restrictions on Subcontracting Outside Disaster or Emergency Area (Nov 2007) (42 U.S.C. 5150).

\_\_\_ (40) 52.232-29, Terms for Financing of Purchases of Commercial Items (FEB 2002) (41 U.S.C. 255(f), 10 U.S.C. 2307(f))

\_\_\_ (41) 52.232-30, Installment Payments for Commercial Items (OCT 1995) (41 U.S.C. 255(f), 10 U.S.C. 2307(f)).

\_X\_ (42) 52.232-33, Payment by Electronic Funds Transfer--Central Contractor Registration (OCT 2003) (31 U.S.C. 3332).

\_X\_ (43) 52.232-34, Payment by Electronic Funds Transfer--Other than Central Contractor Registration (MAY 1999) (31 U.S.C. 3332)

\_\_\_ (44) 52.232-36, Payment by Third Party (FEB 2010) (31 U.S.C. 3332).

\_\_\_ (45) 52.239-1, Privacy or Security Safeguards (AUG 1996) (5 U.S.C. 552a).

\_\_\_ (46)(i) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (FEB 2006) (46 U.S.C. Appx 1241(b) and 10 U.S.C. 2631).

\_\_\_ (ii) Alternate I (APR 2003) of 52.247-64.

\_\_\_

(c) The Contractor shall comply with the FAR clauses in this paragraph (c), applicable to commercial services, that the Contracting Officer has indicated as being incorporated in this contract by reference to implement provisions of law or Executive orders applicable to acquisitions of commercial items: (Contracting Officer check as appropriate.)

\_\_\_ (1) 52.222-41, Service Contract Act of 1965 (Nov 2007) (41 U.S.C. 351, et seq.).

\_\_\_ (2) 52.222-42, Statement of Equivalent Rates for Federal Hires (MAY 1989) (29 U.S.C. 206 and 41 U.S.C. 351, et seq.).

\_\_\_ (3) 52.222-43, Fair Labor Standards Act and Service Contract Act--Price Adjustment (Multiple Year and Option Contracts) (SEP 2009) (29 U.S.C. 206 and 41 U.S.C. 351, et seq.).

\_\_\_ (4) 52.222-44, Fair Labor Standards Act and Service Contract Act--Price Adjustment (SEP 2009) (29 U.S.C. 206 and 41 U.S.C. 351, et seq.)

\_\_\_ (5) 52.222-51, Exemption from Application of the Service Contract Act to Contracts for Maintenance, Calibration, or Repair of Certain Equipment--Requirements (Nov 2007) (41 U.S.C. 351, et seq.).



\_\_\_\_ (6) 52.222-53, Exemption from Application of the Service Contract Act to Contracts for Certain Services--Requirements (FEB 2009) (41 U.S.C. 351, et seq.).

\_\_\_\_ (7) 52.226-6, Promoting Excess Food Donation to Nonprofit Organizations (Mar 2009) (Pub. L. 110-247).

\_\_\_\_ (8) 52.237-11, Accepting and Dispensing of \$1 Coin (SEP 2008)(31 U.S.C. 5112(p)(1)).

(d) Comptroller General Examination of Record. The Contractor shall comply with the provisions of this paragraph (d) if this contract was awarded using other than sealed bid, is in excess of the simplified acquisition threshold, and does not contain the clause at 52.215-2, Audit and Records--Negotiation.

(1) The Comptroller General of the United States, or an authorized representative of the Comptroller General, shall have access to and right to examine any of the Contractor's directly pertinent records involving transactions related to this contract.

(2) The Contractor shall make available at its offices at all reasonable times the records, materials, and other evidence for examination, audit, or reproduction, until 3 years after final payment under this contract or for any shorter period specified in FAR Subpart 4.7, Contractor Records Retention, of the other clauses of this contract. If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for 3 years after any resulting final termination settlement. Records relating to appeals under the disputes clause or to litigation or the settlement of claims arising under or relating to this contract shall be made available until such appeals, litigation, or claims are finally resolved.

(3) As used in this clause, records include books, documents, accounting procedures and practices, and other data, regardless of type and regardless of form. This does not require the Contractor to create or maintain any record that the Contractor does not maintain in the ordinary course of business or pursuant to a provision of law.

(e) (1) Notwithstanding the requirements of the clauses in paragraphs (a), (b), (c), and (d) of this clause, the Contractor is not required to flow down any FAR clause, other than those in this paragraph (e)(1) in a subcontract for commercial items. Unless otherwise indicated below, the extent of the flow down shall be as required by the clause—

(i) 52.203-13, Contractor Code of Business Ethics and Conduct (APR 2010) (Pub. L. 110-252, Title VI, Chapter 1 (41 U.S.C. 251 note).

(ii) 52.219-8, Utilization of Small Business Concerns (DEC 2010) (15 U.S.C. 637(d)(2) and (3)), in all subcontracts that offer further subcontracting opportunities. If the subcontract (except subcontracts to small business concerns) exceeds \$650,000 (\$1.5 million for construction of any public facility), the subcontractor must include 52.219-8 in lower tier subcontracts that offer subcontracting opportunities.

(iii) Reserved.

(iv) 52.222-26, Equal Opportunity (MAR 2007) (E.O. 11246).

(v) 52.222-35, Equal Opportunity for Veterans (SEP 2010) (38 U.S.C. 4212).

(vi) 52.222-36, Affirmative Action for Workers with Disabilities (OCT 1998) (29 U.S.C. 793).

(vii) 52.222-40, Notification of Employee Rights Under the National Labor Relations Act (DEC 2010) (E.O. 13496). Flow down required in accordance with paragraph (f) of FAR clause 52.222-40.

(viii) 52.222-41, Service Contract Act of 1965 (Nov 2007) (41 U.S.C. 351, et seq.).

(ix) 52.222-50, Combating Trafficking in Persons (FEB 2009) (22 U.S.C. 7104(g)).

Alternate I (AUG 2007) of 52.222-50 (22 U.S.C. 7104(g)).

(x) 52.222-51, Exemption from Application of the Service Contract Act to Contracts for Maintenance, Calibration, or Repair of Certain Equipment--Requirements (Nov 2007) (41 U.S.C. 351, et seq.).

(xi) 52.222-53, Exemption from Application of the Service Contract Act to Contracts for Certain Services--Requirements (FEB 2009) (41 U.S.C. 351, et seq.).

(xii) 52.222-54, Employment Eligibility Verification (JAN 2009).

(xiii) 52.226-6, Promoting Excess Food Donation to Nonprofit Organizations. (MAR 2009) (Pub. L. 110-247). Flow down required in accordance with paragraph (e) of FAR clause 52.226-6.

(xiv) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (FEB 2006) (46 U.S.C. Appx 1241(b) and 10 U.S.C. 2631). Flow down required in accordance with paragraph (d) of FAR clause 52.247-64.

(2) While not required, the contractor May include in its subcontracts for commercial items a minimal number of additional clauses necessary to satisfy its contractual obligations.

(End of clause)

**-- END OF SECTION --**

APPENDIX ~~B~~ A

SINGLE PHASE & THREE PHASE

ENERGY METERS



## TECHNICAL SPECIFICATION

### SINGLE PHASE ELECTRONIC ENERGY METERS

Document Reference No.:

Revision No.: 1.1

Compiled by:

Accepted by:

Functional Responsibility:

Approved by;

Signed:

Date:

**KESIP**

Signed:

Date:

**N.Ganji**

Deputy General Manager,  
Commercial Division,  
KED

Signed:

Date:

**Eng. S. Nessar**

General Manager  
KED

Signed:

Date:

**M. Alami**

Chief Commercial  
Officer: DABS



## Table of Contents

1. Purpose .....	3
2. Scope .....	3
3. Standards for Energy Meters .....	3
4. Climatic & Geographic Conditions .....	4
5. General Requirements .....	4
6. Functional Characteristics .....	6
7. Technical Requirements .....	7
7.1 Basic characteristics .....	7
7.2 Requirements for measurement .....	8
7.3 Reading of meters .....	8
7.4 Display .....	8
7.5 Display Parameters .....	9
7.6 Anti-Tamper Features .....	9
7.7 Nameplate .....	10
7.8 Meter cover .....	10
7.9 Protection class .....	10
7.10 Guaranteed Characteristics .....	11
7.11 Typical curves .....	11
7.12 Other capabilities .....	11
8. Meter Testing and Test Inspection .....	11
8.1 Type tests and routine tests .....	11
8.2 Testing of Meters .....	12
9. Exceptions .....	13
10. Training of Employer's Personnel .....	13
11. Instruction Manuals .....	14
12. Technical Assistance .....	14
13. Fitting Materials, Accessories and Special Tools .....	14
14. Packing .....	15
15. Quality Assurance .....	15
16. Tests .....	15
17. Guarantee .....	15
18. Reference List .....	15

# SINGLE PHASE ELECTRONIC ENERGY METERS

## 1. Purpose

This specification describes the minimum requirements for single phase whole current electronic energy meters which are intended to be used by Da Afghanistan Breshna Sherkat (DABS) as customer revenue meters.

General technical particulars are described in the Technical Data Sheets provided with this specification.

## 2. Scope

This scope includes the general requirements, functional requirements, design, manufacture, assembly, inspection, testing at manufacturer's works before dispatch, acceptance, packaging and transportation of the meters to the designated DABS store(s).

The single phase electronic energy meters shall be of digital programmable type and used to measure the active electrical energy consumed by customers.

## 3. Standards for Energy Meters

For the purpose of design, manufacture, quality of new material, tests and manufacturing, the equipment shall meet this Specification and the following IEC Standards and recommendations:

IEC 62053 -21	Electricity Metering Equipment (AC) Particular Requirements Part 21 Static Meters for Active Energy (Class 1)
IEC 62056-21	Data Exchange for Meter Reading, Tariff and Load Control Part 21 Direct Local Data Exchange (previously IEC1107)
IEC 60068-2-6	Environmental Testing - Part 2: Tests- Test Fc: Vibration (Sinusoidal)
IEC 61000-4-2	Electromagnetic Compatibility (EMC) - Part 4: Testing and Measurement Techniques - Section 2: Electrostatic Discharge Immunity Test - Basic EMC Publication
IEC 61000-4-3	Electromagnetic Compatibility (EMC) - Part 4: Testing and Measurement Techniques-Section 3: Radiated, Radio-Frequency, Electro-magnetic Field Immunity Test
IEC 61000-4-4	Electromagnetic Compatibility (EMC) - Part 4: Testing and Measurement Techniques - Section 4: Electrical Fast Transient/Burst Immunity Test - Basic EMC Publication
IEC 61358	Acceptance Inspection for Direct Connected AC Static Watt-hour Meters for Active Energy (Class 1)
IEC 61036	Type Testing for Alternating Current Static Watt-Hour Meters for Active Energy (Classes 1 and 2)

IEC 60529

Degrees of protection provided by enclosures (IP Codes)

Material conforming to other internationally accepted standards, which ensure equal or higher quality than the standards mentioned above would also be acceptable. In case the Bidders who wish to offer material conforming to the other standards, salient points of difference between the standards adopted and the specified standards shall be clearly brought out in relevant schedule. A copy of such standards with authentic English translations shall be furnished along with the offer. In case of any differences between provisions of these standards and provisions of this specification, the provisions contained in this specification shall prevail. In determining the acceptability of any other standard the DABS Project Managers' decision shall be final.

## 4. Climatic & Geographic Conditions

The electronic energy meters shall be entirely suitable for use under the prevailing climatic and geographic conditions as follows:

Altitude:	1,700 - 2,100 meters	
Dry period:	June to November	
Rainy period:	December to May	
Annual rainfall:	327 mm	
Air temperature:	Warmest month +25 °C average, +50 °C noon, +18 °C night	Coldest month -3 °C average, +2 °C noon, -20 °C night
Air humidity:	Average summer 35%	Average winter 75%
Soil thermal resistivity:	Average +1.2 °C m/W	Maximum +3 °C m/W
Maximum solar radiation:	1,200 W/m <sup>2</sup>	
Maximum wind velocity:	25 m/s	
Wind & dust conditions:	Sand & dust storms in summer	
Keraunic level:	23	

## 5. General Requirements

The materials and electronic power components used in the meter manufacturing shall be of highest quality and of reputed make to ensure high reliability, long life and sustained accuracy.

The insulating materials used in the construction of meters shall be non-hygroscopic, non-aging and of tested quality.

The meters shall be of compact modern design with no moving parts, convenient to



transport and immune to shocks and vibrations during transportation and handling.

The meters shall be designed using integrated circuits and manufactured using Surface Mount Technology (SMT).

The meter-base, meter cover, terminal block & terminal block cover shall be made of unbreakable, high grade, fire resistant, non-flammable reinforced polycarbonate to ensure reasonable safety against spread of fire. The terminals shall be suitable for copper or aluminium conductors of sizes up to 16 mm<sup>2</sup>. The manner of fixing the conductors to the terminals shall ensure adequate and durable contact so that there is no risk of loosening or undue heating of the conductors or the terminals. The screw shall have a slot on the head for only a flat screwdriver.

All parts of the meters likely to develop corrosion during operating life shall be effectively protected with suitable protective coating;

The meters shall conform to the degree protection class IP 53 (IEC 60529) for protection against ingress of dust, moisture and vermin;

The meter design shall ensure that the isolation link between current and voltage circuits is located inside the meter main body.

The single phase electronic energy meters shall not have any form of mechanical adjustments, such as trim-pots, potentiometers for calibration.

The meters shall be factory calibrated and no calibration adjustments shall be possible outside the factory facilities.

The meters shall have secured and sealed mounting arrangements for fixing in the meter boxes;

Each meter shall be indelibly marked with connection diagram showing the phase sequence for which it is intended and which shall be attached to the inner side of the extended terminal block cover. In case of any special precaution is required at the time of testing the meter, this shall be indicated in the connection diagram.

The main body of each meter should be permanently sealed and access to the meter should not be possible without causing permanent damage to the meter. Each meter shall provide for adequate sealing of the terminal block cover onto the main body of the meter, using seals which conform to the DABS standard specification, to make the meter tamper evident and avoid fiddling or tampering by unauthorized persons. The DABS standard specification for meter seals is available from DABS.

All the meters shall be of high security design and detect most of the commonly used tamper techniques described in this document.

Although not a mandatory requirement of this specification, the inclusion of Real Time Clock functionality is optional.

## 6. Functional Characteristics

The meters cover shall have one transparent window at the front for reading of all the displayed values and parameters, name plate details and observation of all the operation indicators.

The meters shall provide operational indication device by way of on/off or blinking LED's visible from the front of the windows.

The meters shall have the following separate LED indications:

- Meter calibration
- Phase available indication
- Tamper occurrence indication

The meters shall display all data and information on LED display units/registers;

The meters shall store data in non-volatile memory for a period not less than 10 years under unpowered condition. Battery backup will not be considered as non-volatile memory condition;

The batteries shall have a guaranteed life of not less than 10 (ten) years and shelf-life not less than 15 (fifteen) years.

The battery must be located outside of the meter main body to facilitate simple battery changes.

The meters shall have indications for unsatisfactory performance and/or malfunctioning of the following features:

- All display segments on meter display
- Non-volatile memory status

The meters shall have a test output in the form of LED accessible from the front and capable of being monitored with suitable testing equipment while in operation.

The meter shall not saturate on passage of direct current which can cause the meter either to stop recording or record inaccurately.

The meter shall not get influenced by any external permanent/electromagnet (s).

The measurement by meter shall not get influenced by injection of AC voltages /chopped signal / DC signal and harmonics on the outgoing leads of the meter.

The meter shall record correctly even if the neutral is accidentally or incidentally disconnected.

### Communication Port and Data Transfer

The meters shall have a galvanically isolated optical communication port located in front of the meter for data communication so that it can be easily connected with a Hand Held Unit (HHU) or other related data collection device (Common Meter Reading Instrument, CMRI),

as per IEC 62056-21 or equivalent standard. For the scope of this specification the term HHU and CMRI are used interchangeably.

The HHU shall be capable of being loaded with software for reading / downloading meter data.

The software shall be Windows-based, user-friendly, open platform software and shall provide functionality for receiving data from the HHU in a format that conforms to the requirements of DABS IT systems and applications, as well as uploading instructions and configurations to the HHU.

## **Terminals and Terminal Blocks for Meters**

The terminal block shall be of moulded type with non-hygroscopic, non-ignitable material of good dielectric and mechanical strength.

An extended terminal cover shall be provided to restrict access for tampering without breaking seals.

The terminal cover extension shall be designed to cover cable and cable glands completely inside the box to avoid mishandling of the cables by unauthorized persons.

Sufficient clearance shall be allowed between terminals to avoid flash over. The terminals shall be of electro-plated copper/nickel having rating 150% of  $I_{max}$ .

All connection screws and washers should be tinned/nickel plated brass. The terminals shall be properly bound in the insulation. Terminal screws shall be captive type with pressure plates for connecting to cables. Terminal screws shall not bear directly onto connecting cables.

Aluminum crimping pins of suitable size shall be provided by the manufacturer along with the meters for proper incoming and outgoing termination of the cable ends.

Every meter shall be indelibly marked with a connection diagram attached to the inner side of the extended terminal block cover. In case any special precautions need be taken at the time of testing the meter, this shall be indicated along with the circuit diagram.

The terminal block, the terminal cover and the case shall ensure reasonable safety against spread of fire. They shall not be ignited by thermal overload of live parts in contact with them.

## **7. Technical Requirements**

### **7.1 Basic characteristics**

The basic characteristics of the single phase meters shall include but not be limited to the following:

- Electronic meters shall be of one element type for single phase installation
- Nominal voltage and service type shall be 230V and operating range shall be -30% to +20% of rated voltage. Auto-programmable in range of 120-300 V<sub>AC</sub> to be available.
- Supply frequency: 50Hz  $\pm$  5% and PF zero to 1 (lead and lag)

- Power supply: bottom connected
- Connection shall be direct.
- Rated current: base current ( $I_b$ ) 5A and maximum rated current ( $I_{rated}$ ) up to 80A. The meter shall start registering energy consumption at 0.004% of base current, at unity power factor. The current rating to be supplied will be specified in the Technical Data Sheet accompanying this specification.
- The maximum continuous current ( $I_{max}$ ) in the meters shall be the highest current at which the meter purports to meet the accuracy requirement of the specification
- Accuracy class 1 (Standard IEC 62053-21) or better.
- The active and apparent power consumption in each voltage circuit including the power supply of the meter at reference voltage, temperature and frequency shall not exceed 2W (two watts).
- The apparent power taken by each current circuit at basic current ( $I_b$ ), reference frequency and temperature shall not exceed 4VA (four voltamps).

## **7.2 Requirements for measurement**

Meters shall measure the energy consumption by means of digital sampling or other recognized method.

Accuracy of energy consumption measurement shall not be affected under rapid current fluctuation conditions.

Digital algorithm for measurements processing shall take into account the presence of harmonics

The designs, methods and limiting conditions for the above shall be described in the bid submissions.

## **7.3 Reading of meters**

In case of interruption of electricity supply, the electronic meter register shall retain all metered values in a non-volatile memory.

Reading shall be performed through:

- Direct reading from display as basic method.
- Alternatively, by optical port protocol.

## **7.4 Display**

All information including cumulative active energy (kWh) at all loads & power factors shall be shown alphanumerically on a LCD for display.

The additional functionality of storing the monthly active energy (kWh) in registers for a minimum period of six months is not a mandatory requirement of this specification, but would be viewed favorably.

The registers of the meters shall have at least 6 (six) digits, with no decimal places

displayed, i.e. none of the digits displayed or stored in a register shall represent a decimal point, but a whole kWh unit. This shall be programmed only in the factory and there shall not be any provision for programming at any other place.

The height of the digit shall be minimum 9.0 mm.

In addition to providing the manufacturers serial number and the DABS unique Meter ID number of the meter on the display plate (see 7.7 below), the meter serial number and the DABS unique Meter ID number shall also be programmed into meter memory for identification through the communication port for HHU meter reading print out.

## **7.5 Display Parameters**

The meters shall display the billing parameters in auto-display mode only, in following sequence:

LED test display

- Cumulative active energy (kWh)
- Instantaneous phase voltage (V)
- Instantaneous phase current (A)
- Cumulative tamper occurrence count

Optional features, but not mandatory to this standard are:

- Current month cumulative active energy (kWh)
- Last six months energy consumption (kWh)

## **7.6 Anti-Tamper Features**

The meter shall be immune to reversal of current direction.

The meter shall have the following anti-tamper features and continue to record energy accurately and in the forward mode, under the following conditions:

- Interchanging of incoming and outgoing wires at meter terminals.
- Interchanging of phase and neutral terminals.
- Incoming neutral disconnected and outgoing neutral & load connected to earth (earth loading).
- Outgoing neutral connected to earth via resistor and load connected solidly to ground.
- Phase and neutral interchanged at incoming and load connected to earth.
- The meter registers shall not be resettable to zero.

The meter shall have an LED indication, separate to the blinking calibration LED (see section 6); in the event that any one or more of the above conditions occurs.

The bidder shall furnish the detailed explanations as to how, and to what extent, the meter is able to detect, protect against, and indicate the above tamper and fraud features with sketches and phasor diagrams if required.

Explanations shall include how the integrity of the energy measurement accuracy is

maintained, and how the meter is reset back to normal after detecting a tamper incident. Additional features, if any, in the meter should also be clearly indicated and explained.

## **7.7 Nameplate**

The meters shall have printed, in Dari and English, in an indelible manner the following minimum information:

- Manufacturer's name or trademark
- A meter serial number.
- Owners name: DABS
- DABS Unique Meter ID number *(to be specified by DABS at time of contract award) The serial number should be marked indelibly to the cover or display of the meter*
- Bar-coded DABS Unique Meter ID number
- Year of manufacture
- Meter type
- Meter class
- Nominal voltage operating range
- Base current and maximum current
- Frequency
- Accuracy class
- Watt-hour constant

## **7.8 Meter cover**

The meter case and cover and the extended terminal block shall be of fire resistant polyphenyl oxide or reinforced polycarbonate.

The meter case shall be permanently sealed and encase the main body of the meter, i.e. access to the meter shall not be possible without causing permanent damage to the meter. In this case, the design of the meter case must allow for practical access to change the battery if necessary.

The meter shall provide for adequate sealing on the terminal block cover, using seals which conform to the DABS standard specification. *(The DABS standard specification for meter seals is available from DABS on request.)*

The DABS logo shall be imprinted / etched onto the meter cover.

## **7.9 Protection class**

The meters shall be able to operate indoors and outdoors. Minimum protection class shall be IP53 according to IEC 60529.

### **7.10 *Guaranteed Characteristics***

The bidder shall indicate a list of guaranteed characteristics of his equipment in the schedules of Technical Data Sheets.

### **7.11 *Typical curves***

The offer shall show typical curves with variation ranges, which the Bidder shall guarantee for all meters. Alternatively variation ranges could be shown in the form of tables. Error limits and deviations from these limits are to comply with relevant Standards.

### **7.12 *Other capabilities***

The meters shall comply with the above technical specifications, but other additional features for future upgrading or retrofitting of meters are welcomed. Description of the possible additional characteristics should be included in the offer. The bid evaluation shall be based only on the basic requirements requested in this Specification.

## **8. Meter Testing and Test Inspection**

The Contractor shall carry out all tests required according to this specification at their own cost and inform the DABS Project Manager with reasonable advance notice of the timing of the tests for witnessing and inspection as mentioned in the relevant sections this document.

The DABS Project Manager shall request routine test inspections to be carried out as and when required or may decide otherwise to get the test inspection done by a third party at the cost of the contractor.

### **8.1 *Type tests and routine tests***

The energy meter tests to be carried out in accordance with the standards specified(IEC 52053-11) and shall include, but are not limited to the following:

- AC voltage test
- Insulation resistance test
- Test of limits of errors
- Tests of mechanical inspection
- Tests on dielectric properties
- Tests of immunity to electrostatic discharges fast transient test

- Radio interference measurement
- Test of accuracy requirements
- Test of no load condition
- Test of starting condition
- Test of meter constant
- Repeatability of error test
- Test of power consumption
- Test of electromagnetic compatibility and interference (refer clause 8.2 of this specification)
- Test for demonstration of anti-tamper features (refer clause 7.6 of this specification)

The Type Tests shall be performed at a reference voltage of 230/400V and a reference frequency of 50Hz. The calibration of meters shall be done with standard reference meters of accuracy class 0.2 or better.

## **8.2 Testing of Meters**

### Type Test

The energy meter shall be fully type tested by any of the following accredited international testing laboratory as per relevant International Standards.

- KEMA - Holland
- CPRI - India
- ASTA - United Kingdom
- CESI - Italy
- PEHLA - Germany

All type tests as per standards and for the parameters which are stringent in the technical specification, and tests to demonstrate anti-tamper features, should have been conducted before submission of the bid. These type test reports along with forwarding letter of the test house shall form part of the bid without which the bid will be considered incomplete and rejected. The submission of incomplete type test reports shall also call for rejection of the bid.

The type test reports shall not be more than three years old.

### Acceptance / Sample test

The acceptance/sample tests will be done as per specifications (IEC 61036 and IEC 61358) and shall be witnessed by the DABS representative(s). The acceptance/sample



tests for a minimum of 10 (ten) meters shall be carried out duly witnessed by the DABS representative(s) for each consignment of meter supply.

### Routine Test

Routine tests as per specifications (IEC 61036 and IEC 61358) shall be carried out on all meters and each consignment of meters shall be accompanied by one set of routine test results recorded in tabular form in hardcopy and softcopy format.

If the test results are recorded in separate sheets all such sheets pertaining to each consignment shall be bound together as one volume for the approval of DABS.

### Electromagnetic compatibility and Interference

Meters shall meet the following electromagnetic compatibility and interference requirements to avoid use of any unauthorized external magnet for tampering the meter operation:

- The continuous (DC) “stray” magnetic induction shall be 67mT +/- 5% at a distance of 5 mm from the surface of the pole of the electromagnet energized with DC supply;
- The continuous (DC) “abnormal” magnetic induction shall be 0.27 Tesla +/- 5% at a distance of 5 mm from the surface of the pole of the electromagnet energized with DC supply;
- The alternating (AC) “stray” magnetic induction shall be 0.5 mT +/- 5% by placing the meter at various orientations energized by AC supply;
- The alternating (AC) “abnormal” magnetic induction shall be 10 mT +/- 5% by placing the meter at various orientations energized by AC supply;

## 9. Exceptions

The Bidder shall attach a list of exceptions which indicate, with clear explanations, the deviations of his offer regarding these Specifications. Not presenting a list of exceptions shall imply that the Bidder is in complete accordance with the requirements of the present specification.

## 10. Training of Employer’s Personnel

The contractor shall organize on-site training on the meter technology, installation, testing and commissioning, including operation and maintenance of energy meters, etc. for personnel specified by DABS.

The training shall ensure that DABS staff can install, read, maintain, test, operate, and download the data from the meters.

Training shall be provided on-site, at a venue to be arranged by DABS, to a group of up to 20 staff for operation and maintenance of the meters and associated equipment. The

training shall be provided when the Contractor has completed the supply of first lot of meters.

## 11. Instruction Manuals

Together with the supply of meters, ten (10) complete hard copies plus one (1) softcopy, of the following instruction manuals shall be included for each type of meter:

- Mounting, connection and operation manuals, including parts manual;
- Installation and use of software.

Manuals shall be in English and Dari.

In addition, one hundred (100) hard copies plus one (1) softcopy, easy-to-use pocket-sized booklets or pull-out brochures covering the basic meter operation shall be provided in Dari, plus one copy in English, for use by the meter readers.

Instructions shall be clear and precise with no ambiguities. If necessary, instructions should be accompanied by sketches, diagrams, etc.

The DABS Project Manager may request additional instructions or information if the manuals seem to be insufficient or unsatisfactory. The Contractor is obliged to provide all information required by the DABS Project Manager.

## 12. Technical Assistance

The Bidder shall include in his offer technical assistance for the installation and operation of meters, for programming and software use, and for training for correct use of the equipment.

## 13. Fitting Materials, Accessories and Special Tools

The Bidder shall indicate and supply all fitting materials, accessories and special tools which are required for mounting, adjusting, maintaining and operating the offered equipment together with a list of unit prices.

The Bidder shall provide details of the tools and equipment necessary to test the proposed meters to be supplied.

## 14. Packing

All packing shall assure safe transport of the equipment under all conditions and limitations that could be encountered. The packing shall protect the equipment up to arrival at its final destination against breakage, damage and losses due to breakage of the covering. The final packing shall provide easy handling, transport and warehousing. Each package shall indicate the number of parts it contains, type, name of manufacturer, the purchase order/contract number, shipment number, box number, the net and gross weight and the permissible stacking height, country of origin the owner's code mark and the DABS unique ID numbers.

## 15. Quality Assurance

The Manufacturer / Supplier shall have established a Quality Assurance System based on ISO 9001 or 9002. The Supplier shall include documentation of the system with a list of current procedures, an organization chart of the quality organization and the name of the quality manager. He shall also submit a list of quality revisions performed in the last twelve months with a list of findings, as well planned revisions for the coming twelve months.

The Supplier shall submit for approval a program of quality control and inspection procedures to assure that the product during manufacture and on completion complies with the specified requirements.

## 16. Tests

The Bidder and Contractor for the equipment shall submit all protocols and test results (type tests with the offer, and routine tests with delivery of supplies) performed on equipment according to the specified international standards.

## 17. Guarantee

The Bidder shall state clearly in his offer the guarantee period for each piece of equipment. The minimum acceptable guarantee period shall be two (2) years from the date of handing over the equipment or system.

## 18. Reference List

The Bidder shall include in his offer a list of its principal clients, with contact details, to whom the manufacturer has supplied equal or similar meters as indicated in the present Technical Specification in the past 3 years.

APPENDIX ~~C~~<sup>B</sup>

BOUNDARY/LOGGER

3 PH 20 KV



## Medium Voltage Monitoring Without Low Voltage Supply

### Application

PowerSense delivers cutting-edge monitoring and control equipment together with integrated supervision, which enables the modern electrical utility to prepare its existing power infrastructure for tomorrow's SmartGrid.

PowerSense uses world-leading technology to merge existing and new power infrastructure into the existing SCADA and new IT systems of the electrical utilities. The integration of the upgraded power infrastructure and IT systems instantly improves outage and fault management that will decrease the Customer Minutes Lost (SAIDI). At the same time, this integration will help the electrical utility to further improve its asset management – resulting in major cost savings.

The PowerSense product line is called DISCOS®.

#### Primary benefits are:

- Cutting-edge optical technology (the sensor)
- Easily and safely retrofittable (sensors can be fitted onto the majority of cable types)
- End-to-end solutions (from sensors to laptop)
- Installation in steps (implementation based on cost-benefit analysis).

The PowerSense Overhead Line Solution has been designed for overhead line installations with or without substations. The solution is based on PowerSense's optical DISCOS® Sensor technology and a specially designed Linux-based RTU module. The DISCOS® System Sensors are installed directly onto the MV and the LV power lines and has been designed to be retrofitted to any existing power equipment. Installation of the DISCOS® System on the MV lines can be done live and does not require powering down the distribution transformers. Installation of the DISCOS® System on the LV lines can also be done live and without making any electrical or physical intervention in the installation.

The PowerSense Overhead Line Solution can be used in combination with the PowerSense Kiosk and Chamber Substation Solution and can also be supplied for new installations.

The DISCOS® System is a cost-effective, modular system for remote

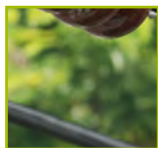
- integrated supervision
- control
- operation
- condition monitoring

of medium voltage (MV) and low voltage (LV) power distribution grids. DISCOS® System provides a platform for future applications.

Selection of the DISCOS® technology over traditional solutions buys into the future, thus safeguarding the investment as well as delivering the potential of more benefits in changing electric network structures and business environments. For instance, the DISCOS® solution includes:

- Advanced line fault indication, including distance-to-fault indication
- Three-phase diagnostics, including three-phase voltage (phase-phase), three-phase distributor current, phase angles, and three-phase distributor power (kVA, kVAR, kW, PF).

Solution for the DISCOS® System Version 2, 1009



## Benefits

### 1. Extensive Dynamic Range and Accuracy

No ferromagnetic cores are used in the optical sensors. The optical sensors allow a wide range of measurements to be achieved with the same device. They are not subject to saturation and are linear over the entire range. The system is optimized for currents up to 20,000 A. The optical sensor accuracy varies in the dynamic range:

5-100 A	+/-2 A
100 A-20,000 A	2%

### 2. Electrical Insulation

The sensors consist of 95% plastic and 5% glass, and are therefore suitable for direct placement on bare electrical conductors. This guarantees immunity against ground loop, which usually affects ferromagnetic devices. Conventional current transformers will generate dangerous over voltages if a secondary circuit is opened under load. This hazard is avoided completely by using optical sensors.

### 3. Small Footprint and Light Weight

Sensors are 98% smaller and lighter than conventional current transformers. The conventional electrical wiring is replaced by compact optical cables.

### 4. Easy Installation

- Very little space is required for system modules and sensors allowing installation in compact stations with modern compact switchgear.
- The system may be installed on ring main units (RMU) without interrupting power supply to customers.
- Interconnection of modules is safe and fast by means of integrated terminal blocks.
- Parameter setting and calibration is done using a graphical PC tool, DISCOS® Discman.
- Provisions are made for remote parameter setting.

### 5. Versatility

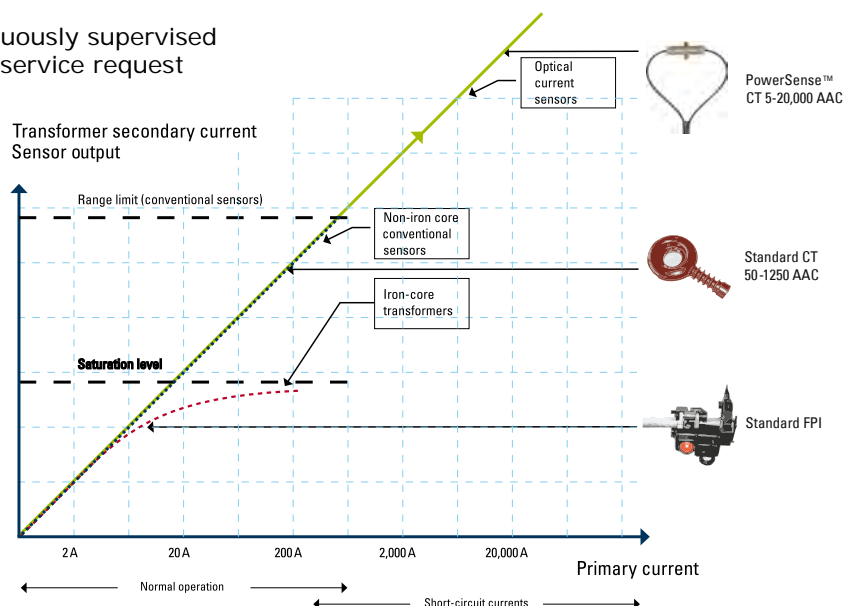
- For use in new and existing MV stations regardless of layout.
- Systems can easily be customized for the specific application, thanks to the modular design.
- No current or voltage transducers are required in the station.
- DISCOS® System provides a broad range of supervision and control functions for remote operation of switches allowing fast fault localization, fast power restoration, and optimal everyday operation.

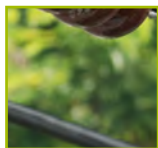
### 6. Reliability

- All modules and sensors are continuously supervised and will issue a system alarm or a service request if user interaction is required.
- Time-out and re-transmission features.
- Persistent loss of communication or severe system failures are detected by periodic check-up calls.
- Important alarm indications, e.g. short-circuit indications, are also displayed locally.
- No periodic inspection or re-calibration needed. Easy retrofit of serviceable components.

### 7. Enhanced Data Management

- Data collection.
- Data management.
- Alarm management.
- Fast integration.





## Solution

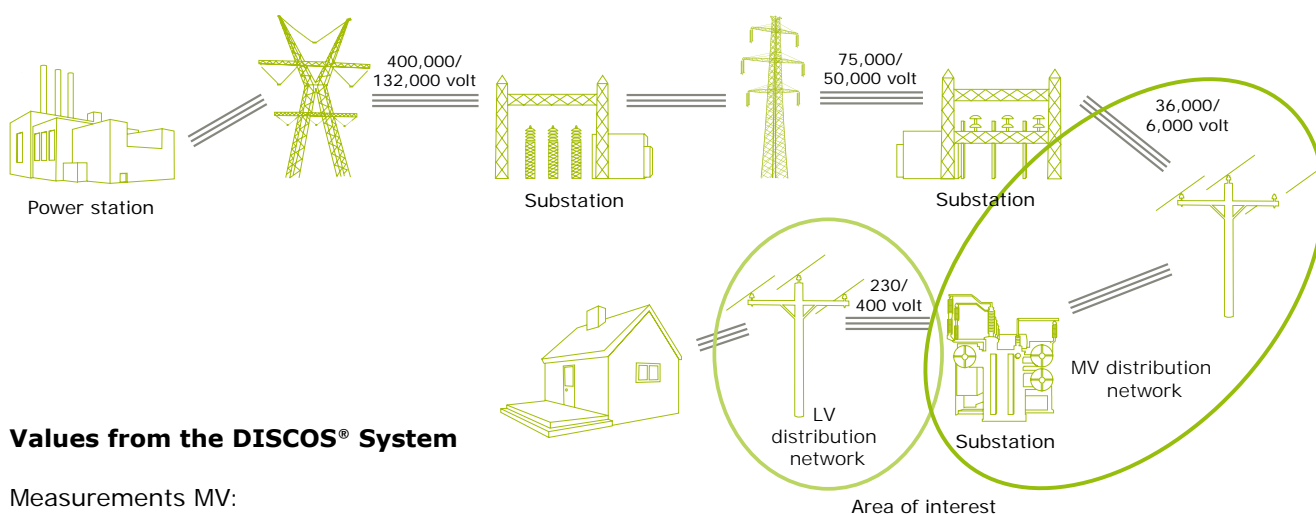
### System Overview

The DISCOS® System has been designed to provide the control centre operator with reliable information from MV transformer stations, both under normal operating conditions and during outages. The main components of the overhead line solution without LV supply are:

- DISCOS® Outdoor Combined Sensor
- DISCOS® Opti module
- DISCOS® MV module
- DISCOS® SmartCom RTU
- DISCOS® Power Pack.

The optical sensors are clamped directly onto the MV conductors, one per phase, and connected to the DISCOS® Opti module. Each DISCOS® Opti module handles three optical sensors. The communication between the sensors and the DISCOS® Opti module is done through a non-conductive fibre cable, which ensures electrical isolation between power system conductors and the measuring system. Each module is connected, through a CAN bus, to a DISCOS® SmartCom RTU. The DISCOS® SmartCom RTU is the central processing unit for the measurements and calculations done by the DISCOS® System.

### 3G End-to-end Solution



### Values from the DISCOS® System

Measurements MV:

- Current (for each phase)
- Voltage (for each phase)
- Power active, reactive and direction
- Load balance
- Distance to fault (short-circuit fault measured as impedance)
- Open phase detection
- Control of breakers and service relays
- Analogue inputs
- Earth-fault indication (designed for resonance coil grounded networks).

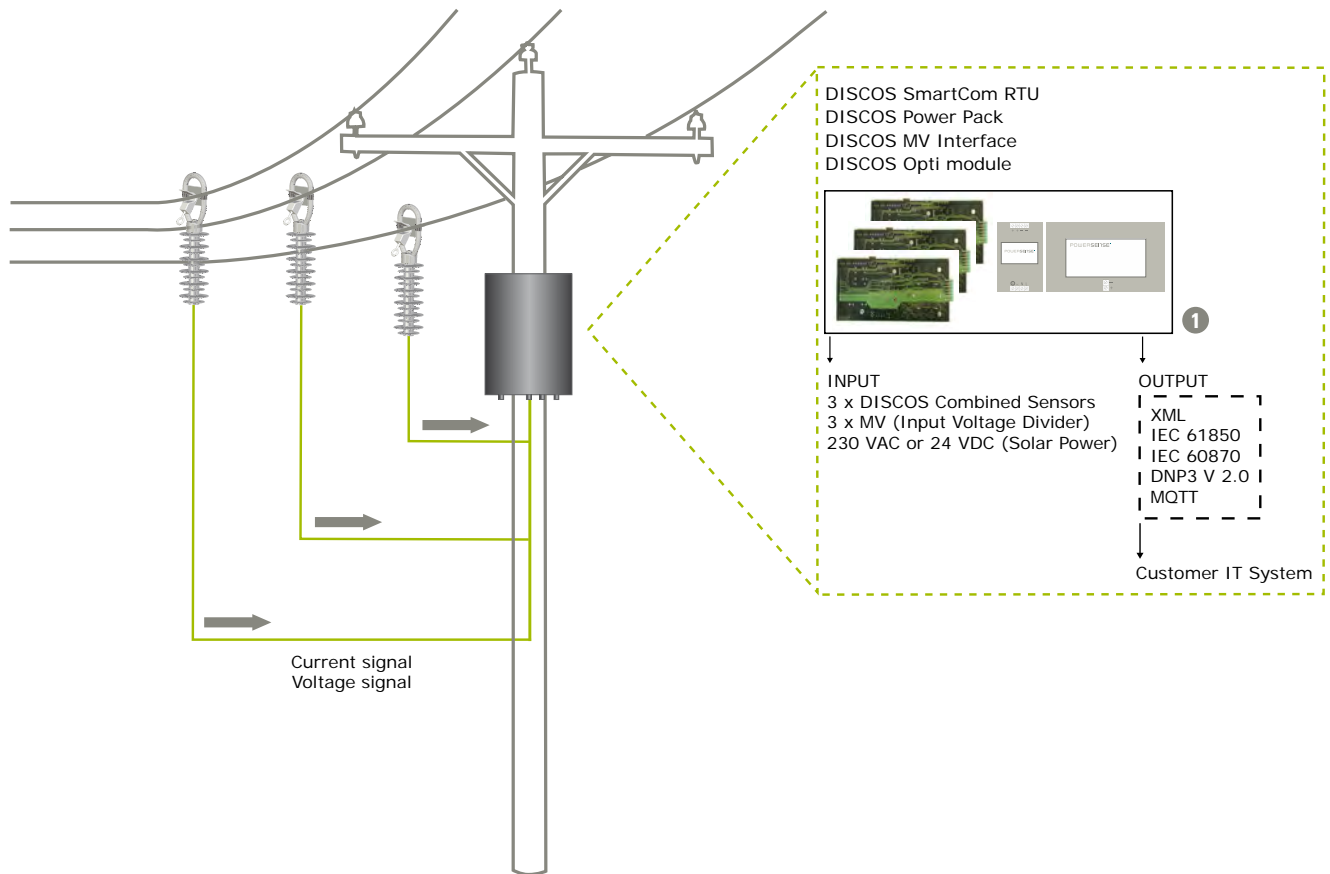
Measurements LV:

- Power (V, I, P and Q)
- Single phase dead.





## Application Example



### Bill of Material:

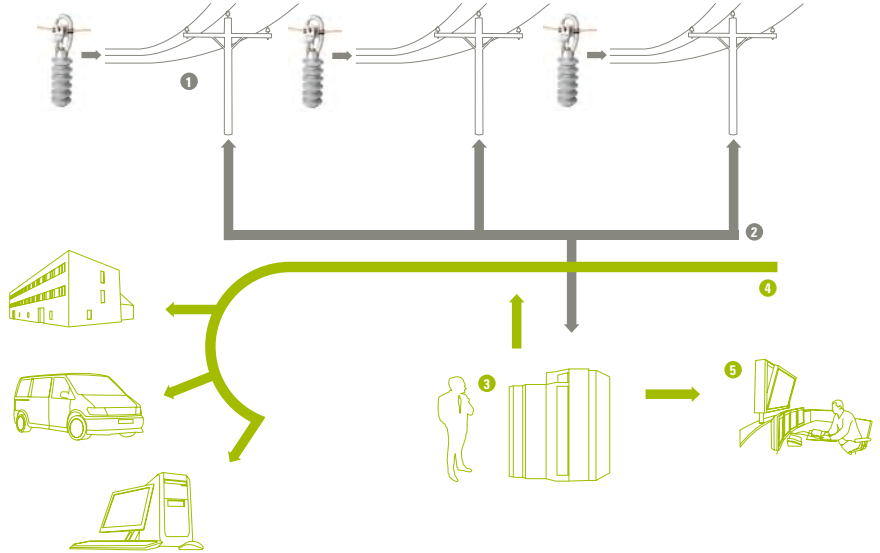
- **Device 1**
  - 1 x DISCOS® SmartCom RTU
  - 1 x DISCOS® Power Pack
  - 1 x DISCOS® MV Interface
  - 1 x DISCOS® Opti module
  - 3 x DISCOS® Outdoor Combined Sensor
  - IP56 box design – 30 cm x 56 cm x 19 cm / 11,81" x 22,05" x 7,48" (w x l x h)





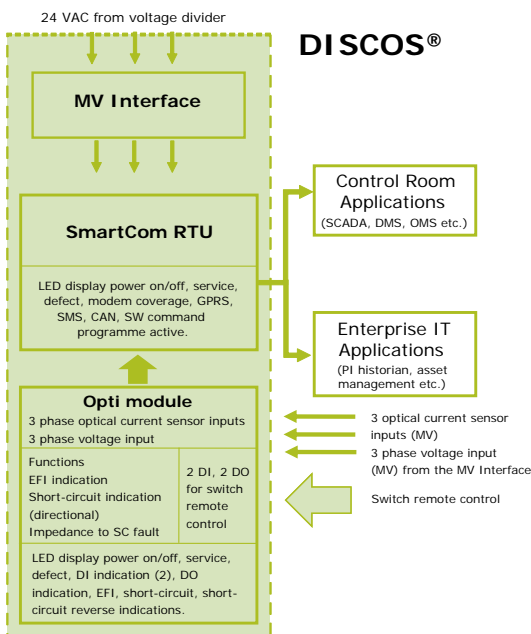
## End to End

1. The DISCOS® Outdoor Combined Sensor and the DISCOS® MV Interface are installed directly on the MV power lines.
2. The DISCOS® SmartCom RTU can communicate through several different channels, for example SMS, GPRS/3G, TCP/IP, RS232, USB, WiMAX. Different messages can be sent through different communication channels. This means that fault management information can be sent directly to the SCADA system, and asset management information can be sent to other IT systems.



3. Data are available in the customer database.
4. Data are available in the customer's high-level IT system through the Advanced Service Bus System.
5. All data are visualised in the SCADA platform.

## Application Example



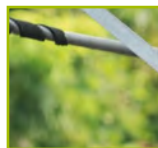
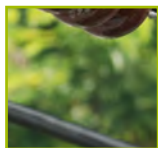
Note:

The following abbreviations are used:

DI = Digital Input

DO = Digital Output

AI = Analogue Input



## System Description



### DISCOS® SmartCom RTU

The DISCOS® SmartCom RTU is designed to link and integrate the DISCOS® System into high-level IT systems like SCADA solutions or other grid management IT platforms.

The DISCOS® SmartCom RTU is based on an open source Linux core, which offers the following ways of communication:

- 2-way operational communication with: SMS, GPRS/3G, TCP/IP, RS232, USB, WiMAX
- Transport protocols implemented: raw XML, IEC 61850, IEC 60870, MQTT and designed for DNP3 ver. 2
- Remote parameter setting
- Remote updatable
- Time-out and re-transmission features
- Alarm management
- Data management (30+ days' storage).

### DISCOS® Power Pack

The DISCOS® Power Pack powers the DISCOS® System. The power is taken from the LV side of the transformer. The DISCOS® Power Pack has been designed to keep the modules alive for 4+ hours during a power outage. This is enough time to report to the central control centre any information from the power grid that can be useful in solving the power problem.

- 24 V back-up supply and charger for the system
- Optional solar power solution.



### DISCOS® MV Interface

The DISCOS® MV Interface is an interface module between the DISCOS® Opti module and the DISCOS® Outdoor Combined Sensors.

- 3-phase inputs for 3 DISCOS® Outdoor Combined Sensors.

### DISCOS® Opti Module

Supervision and control module for MV/LV lines and transformer bays. The DISCOS® Opti module measures current from 5-20,000 AAC on cables and overhead lines.

- 3-phase optical current measurement for power lines up to 36 kVAC
- 2 binary digital outputs e.g. for circuit breaker (make or break)
- 2 binary inputs e.g. for breaker indication
- Analogue oscilloscope output for each line
- 3-phase voltage
- Active and reactive power
- Daily peak load - active and reactive
- Short-circuit indication - directional and non-directional
- Distance-to-fault -  $\Omega$  (only short-circuit fault)
- Open-phase fault/transformer fuse blown
- Voltage out of range
- Earth-fault indication (designed for resonance coil grounded networks).





## System Description

### DISCOS® Outdoor Combined Sensor

The DISCOS® Outdoor Combined Sensor measures the current and voltage amplitude and the phase angle on the MV power grid.

The DISCOS® Outdoor Sensor offers:

- Easy, safe and quick installation using a standard hot stick
- Silicon polymer housing with specific design for outdoor application
- Maximum safety based on a full range of tests.

Specifications:

- Current measurement on lines with up to 36 kVAC
- Dynamic range from 5-20,000 AAC
- All materials are non-conductive and can therefore be mounted on live cables and copper bars, without any additional precautions.



### The DISCOS® System Boxes

Customized boxes for indoor and outdoor use.

- The modules are connected via a bus system
- The black box type is for indoor use only
- Outdoor boxes can be delivered in all IP classes
- Outdoor boxes can be delivered with pole mounting brackets.



# POWERSENSE<sup>®</sup>

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APPENDIX ~~D~~<sup>C</sup>

REINFORCED

CONCRETE POLE

**CEB STANDARD 044-1 : 1996**

*Specification*

*for*

***REINFORCED CONCRETE POLES***

CEYLON ELECTRICITY BOARD

SRI LANKA

*Specification*

*for*

## **REINFORCED CONCRETE POLES**

**CEB Standard 044-1 : 1996**

**CEYLON ELECTRICITY BOARD**

No. 50, Sir Chittampalam A. Gardiner Mawatha, Colombo 2.  
Sri Lanka

Telephone: 24471-8    Telex : 21368 CE    Facsimile: 94-1-449572

## CONTENTS

	PAGE NO.
1. General	02
2. Design Loadings	02
3. Standards and Codes of Practice	02
4. Standardized Types/Sizes of Pre-stressed Concrete Poles	03
5. Materials	03
6. Storage and Protection of Materials	06
7. Installation of Reinforcement Steel	06
8. Mixing, Placing and Curing Concrete	07
9. Concrete Sampling and Testing	08
10. Inspection and Testing of Poles	11
11. Transportation and Handling	12
12. Annexures	13



**SPECIFICATION FOR  
REINFORCED CONCRETE POLES**

**1. GENERAL**

This Specification covers the manufacture, testing and delivery to the site of Reinforced Concrete Poles, for Low Voltage & Medium Voltage distribution lines.

**2. DESIGN LOADINGS**

Each pole shall be able to withstand 2.5 times the design working load in the transverse direction, as indicated in the corresponding drawing.

Each Pole shall be able to withstand an independent load in the longitudinal direction of at least 25% of the transverse loading described above.

The ultimate design load used for designing each type of pole shall be that calculated by applying a point load of 2.5 (factor of safety) times the appropriate standard design working load when the pole is held in the test frame specified in the Clause 10.

**3. STANDARDS AND CODES OF PRACTICE**

Unless otherwise specified, the materials and workmanship specified under this contract shall conform to the latest version of the appropriate British Standards. In particular to:

BS 8110	1985	Structural use of Concrete
BS 12	1991	Specification for ordinary Portland Cement
BS 4449	1988	Specification for carbon steel bars for the reinforcement of concrete
BS 4482	1985	Cold reduced steel wire for the reinforcement of concrete
BS 882	1992	Specification for aggregates from natural sources for concrete
BS 1881	1993	
Part	101	Sampling of fresh concrete

## DRAFT CEB STANDARD 044-1: 1996

		102	Determination of slump
		108	Method of making test cubes from fresh concrete
		110	Method of making test cylinders from fresh concrete
		111	Method of normal curing of test specimens
		116	Method for determination of compressive strength of concrete cubes
BS 812 Part 101	1984	Testing aggregates	
BS 5328	Part 1	1991	Guide to specifying concrete
	Part 2	1991	Methods for specifying concrete mixes
	Part 4	1990	Specification for the procedures to be used in sampling, testing and assessing compliance of concrete.

#### 4. STANDARDIZED TYPES/SIZES OF REINFORCED CONCRETE POLES

HEIGHT OF POLE (m)	BURIED LENGTH (m)	WORKING LOAD (kg)	PURPOSE	CEB DRAWING NO. *
6.0	1.4	50	Insulated Wire Service Connection	DS&S/95/7710
8.3	1.40	100	LV Lines (without street lamp wire)	DS&S/95/7709
8.3	1.40	500	LV Lines (self supporting pole)	DS&S/95/7720
9.0	1.5	115	LV Lines (with street lamp wire)	DS&S/95/7707
10.0	1.7	300	i. Only MV Line ii. Combined Run MV & LV on same Pole	DS&S/95/7705

\* Reduced size drawings of each type of pole are annexed to this Specification. Detailed drawings could be obtained from the respective Branch of the CEB.

## **5. MATERIALS**

### **5.1 General**

All materials shall conform to the relevant standard specifications referred to in this specification. However, the Inspection Officer representing the CEB (herein after called the "Engineer") reserves the right, where necessary, to inspect/test samples of raw materials stockpiled for use, in any of the contractors work sites. Cost of such tests will be borne by CEB. In the event of such samples not confirming to the standards given herein, the Engineer may inform such to the Contractor in writing on the receipt of which, the contractor shall make immediate arrangements to remove such unsuitable materials completely from the work site, and replace them with materials conforming to the standards, at the contractors own expense.

Manufacturer's test certificates for all reinforcing steel shall be supplied to the Engineer in accordance with the said standards in Clause 3. These test certificates shall show compliance with the relevant standard specifications in all respects and shall be issued by an independent testing laboratory acceptable to the Engineer. If the manufacturer's test certificates are not available and if the Engineer requires it then it shall be the Contractor's responsibility for arranging all testing requested by the Engineer, before using such materials.

The test information so obtained must be sufficient to satisfy the Engineer that the item being tested conforms to the relevant standard specification. The Contractor shall bear the cost of these testing work.

### **5.2 Reinforcing Steel**

Steel reinforcement shall be one of the following :

- a) Hot rolled mild steel round bars complying with BS 4449.
- b) High tensile steel either (i) cold worked deformed bars or (ii) hot rolled bars

The contractor shall supply the Engineer with a certificate for each consignment from the steel manufacturers showing that the steel meets the requirements of the specification. If required, the Engineer may carry out one tension test and one bond test for each lot of 50 tonnes or part thereof.

Steel reinforcing bars shall be kept clean and shall be free from pitting, loose rust, mill scale, oil, grease, mortar, earth, paint or any harmful material.

### **5.3 Cement**

Cement shall be Ordinary Portland Cement complying with BS 12.

Insoluble matter in the cement used shall be less than 3 percent, and magnesium compounds shall be less than 5 percent.

All cement necessarily complying with BS 12 shall be obtained from the manufacturer

or from his authorized distributors acceptable to the Engineer.

Test Certificates for cement satisfying the relevant standards shall be provided by the contractor when requested by the Engineer where necessary before use is made of a particular brand of cement.

#### **5.4 Aggregates**

Both the fine and coarse aggregates shall comply with BS 882 - 1992. Fine aggregate (sand) shall consist of clean sands and coarse aggregate shall consist of clean crushed stone. The nominal maximum size of the coarse aggregates shall be 20 mm.

Aggregates shall be free from clay, earth, loam or other organic or similar material. Aggregates which in the opinion of the Engineer is not clean, shall be thoroughly washed in clean water before use.

Prohibited Aggregates :

- coming from feldspathic or schistous rock
- containing charcoal or their residues such as coke, ashes, clinkers etc.

Sulphate and Sulphide must be in such quantities that the whole proportion, in Sulphur Trioxide, be less than one percent (1%) of the mass.

#### **5.5 Water**

All water used for the mixing of concrete shall be clean and free of any dissolved or undissolved impurities likely to be harmful to the cement, aggregates or the steel reinforcement.

The use of sea water is prohibited.

The water shall contain less than 700 parts per million (ppm) of dissolved solids.

The water should comply with the requirements of BS 3148.

#### **5.6 Admixtures**

No admixtures shall be added to the concrete mix unless the prior approval of the Engineer has been obtained in writing.

All admixtures shall comply with BS 5075. Approval by the Engineer of the use of any admixtures shall in no way relieve the Contractor and his supplier of their responsibility in regard to maintaining the quality or durability of the concrete used in the manufacture of poles.

Under no circumstances shall calcium chloride or any admixtures containing calcium chloride be permitted in the concrete used to manufacture the poles.

## **6. STORAGE AND PROTECTION OF MATERIALS**

### **6.1 Cement**

Cement shall be stored in a suitable weather-tight enclosure on a broad platform raised off the ground. The enclosure should be such that free circulation of air around the bags of cement is kept to a minimum.

Any cement that has become damp, caked or lumpy shall not be used. Concrete batching operations shall be organised so that cement that has been longest at the place of manufacture of the poles is used first.

If the Engineer has any doubts with regard to the quality of a certain batch of cement at site, samples of that should be retested for fineness, setting time, strength and soundness in the presence of the Engineer and in the event it fails the tests such cement should be removed from site immediately.

### **6.2 Aggregates**

Both fine and coarse aggregates shall be separately stored so that they are kept clean and free from contamination and are not subjected to intermingling. Where a clean hard surface is not available for the stockpiles the bottom 150 mm of the aggregate piles which are in contact with the ground shall not be used.

Heaps of fine aggregate shall be capable of draining freely. Wet fine aggregate shall not be used until, in the opinion of the Engineer, has drained sufficiently to ensure proper control of the water/cement ratio.

### **6.3 Reinforcing Steel**

All reinforcing steel shall be stored clear off the ground on sufficient supports to prevent distortion of bars and in a clean dry place. Grease, oil, paint or any other substance that will affect the bond of the reinforcement shall not be allowed to come in contact with it. If it does then all such substances shall be cleaned off the reinforcement before it is placed in the pole moulds.

Mild steel and high tensile steel shall be stored separately.

## **7. INSTALLATION OF REINFORCEMENT STEEL**

### **7.1 Covers**

The **minimum cover** from the outermost reinforcing steel to the nearest permanent surface of the concrete member shall be 25mm. All steel shall be accurately placed and shall be held in position during manufacture.

### **7.2 Spacing**

The clear spacing between two parallel reinforcing bars shall not be less than the greatest of the nominal bar diameter or 1.33 times the maximum nominal size of the aggregate or 25 mm.

**7.3      Stirrups and Ties**

Bends in stirrups and ties shall have a diameter on the inside of the bar not less than the diameter of enclosed bar or two times the diameter of the stirrup or tie, whichever is the greater as per the corresponding drawing.

The ends of the stirrups and ties shall be anchored with a minimum of 90° bend plus a straight extension of 8 bar diameters but not less than 65 mm. They shall be firmly attached to the supporting tendons/reinforcement using soft wire ties.

**7.4      Welding**

Any form of welding or tack-welding of reinforcement will not be permitted.

**8.       MIXING, PLACING AND CURING CONCRETE**

**8.1      Mix Design**

Concrete used for casting of poles throughout this contract shall be of grade 25 which should possess the following minimum qualities (as per BS 5328).

i)	Minimum Cement content	-	275kg/m <sup>3</sup>
ii)	Maximum free water-cement ratio	-	0.65
iii)	Minimum strength at an age of 28 days	-	25N/mm <sup>2</sup>
iv)	Nominal maximum aggregate size	-	20 mm

The ratio of the weight of the fine aggregates (sand) to the total weight of aggregates shall be between 0.35 and 0.50. As a guide, a mixing ratio of 1:1½:3 (cement:sand:metal) is suggested.

However it is the full responsibility of the contractor to ensure that the design strength of the concrete and the concrete mix is not varied unless by agreement with the Engineer.

**8.2      Concrete Mixing**

All concrete except where specifically permitted by the Engineer in writing shall be mixed in mixing machines.

The dry concrete ingredients shall be mixed until a uniform colour is obtained. After the addition of the water the concrete shall be mixed for a further 2 minutes or until a uniform colour is achieved. The total water in the mix shall not exceed the amount specified in the Clause 8.1 above.

In computing the quantity of water to be added, due account must be taken of the water contained in the aggregates. The amount of water shall be sufficient to ensure thorough hydration, good workability and high strength.

### **8.3 Workability**

The concrete shall be of such consistency that it can be readily worked into the corners and angles of the formwork and around reinforcement without segregation of the materials or bleeding of free water at the surface. On striking the formwork it shall present a face which is smooth & uniform, free from honeycombing, or excessive dusting. Water should be added with great care, without letting the total water content to be excessive.

### **8.4 Transportation**

The concrete shall be discharged from the mixer and transported to the Works by means that shall be approved by the Engineer and which shall prevent adulteration, segregation or loss of ingredients, and ensure that the concrete is of the required workability at the point and time of placing.

### **8.5 Placing and Compaction**

Placement of concrete shall be at such a rate that the concrete is at all times plastic and flows readily into the space between the reinforcement. No concrete that has partially hardened or been contaminated by foreign materials shall be deposited in the moulds, nor shall re-tempered concrete or concrete that has been re-used after initial set be used.

The placement of concrete in the moulds shall be completed within half hour after the introduction of mixing water to the cement and aggregate in the concrete mixer. Each mould shall be filled with concrete as a continuous operation. Construction joints will not be permitted in the poles. Should there be an interruption during the placement of concrete into the mould such that initial set occurs to the deposited concrete then that pole shall be discarded.

All concrete shall be consolidated in the moulds using **high frequency vibrators**. The vibration applied shall be uniform along the length of the mould and shall be carefully controlled so that adequate consolidation is achieved without segregation of the mixed ingredients by over vibration.

### **8.6 Protection and Curing of Concrete**

During the initial stages of hardening, the concrete shall be protected from direct rays of the sun and from drying winds. The moulds containing the hardened concrete shall not be disturbed or shifted unless it can be shown that such movements will not impart any damaging stress to the hardening concrete.

## **9. CONCRETE SAMPLING AND TESTING**

### **9.1.1 General**

A random sampling procedure, to obtain the samples for compression strength tests of concrete has to be adopted, and the maximum frequency of sampling of the concrete shall be (01) one sample per (50) fifty poles, but not less than one sample per day, whichever gives the higher number of samples. "Sample" is described in Cl. 9.1.2. Contractor shall make arrangements to carry out the compression strength test as per BS 1881, for each of above samples, at an independent testing laboratory approved by the Engineer, and the results of these tests shall be brought to the notice of the Engineer within 10 working days from each test. The acceptance of concrete will be decided by the Engineer, as described in Clause 9.3.

### **9.1.2 Casting of Samples**

Samples for compression strength tests shall be moulded in either 150mm or 100mm cubes. The date of casting of the sample shall be clearly and indelibly marked on the fresh concrete. Subsequent marking on freshly applied grout layer is not allowed.

A sample shall consist of 4 cubes made concurrently from the same batch of concrete. Two (2) of the cubes shall be used to establish the 28 day compression strength and two (2) of the cubes shall be used to establish the 07 day compression.

All samples shall be moulded and cured in accordance with the procedures in BS 1881.

## **9.2 Compression Strength Tests**

Testing of the compression strength samples shall be carried out in accordance with the procedures in BS 1881.

The minimum required 28 day compression strength of all concrete used to manufacture concrete poles shall be 25 N/mm<sup>2</sup>.

## **9.3 Acceptance Criteria for Compression strength**

The concrete shall be considered acceptable when tested and found satisfactory according to stipulations in B.S. 5328 Part 4.

## **9.4 Pole Moulds and Surface Finishes**

Moulds shall be designed, constructed and finished to ensure they can be removed



without damaging the hardened concrete, and they shall be securely braced and supported to prevent sagging and bulging during the deposition of the concrete. Joints in the materials used to manufacture the moulds shall be tight and shall not permit any leakage of cement paste from the concrete mix. Holes in the walls of the moulds used for retaining pins which form bolt holes in the finished pole shall be provided with flexible seals or some similar means to prevent the loss of any cement paste from the concrete mix.

All poles shall have a surface finish that is smooth, hard, uniform in colour and appearance and free from any honeycombing and air pockets exceeding 4mm in diameter. All fins and other projections shall be rubbed down or ground flush with the general surface of the pole.

Repair of defective concrete will **not be permitted** and any pole containing defective concrete will be **rejected** by the Engineer.

### 9.5 Dimensional Tolerances

The permitted variation from a stated dimension or cross sectional shape of the finished pole shall be as follows. Any pole having dimensional tolerances above the figures given below will be rejected by the Engineer.

Length	" 15 mm
Cross Section	Overall dimensions and dimensions of parts such as webs etc. + 4mm, - 2mm
Straightness	Deviation from a straight line joining the top end and the widest dimensions at the butt end " 15 mm
Holes	Size - 0, + 2 mm relative position " 5 mm
Location of Reinforcement	" 3mm, but specified covers shall not be reduced

Notwithstanding all of the above, any apparent waviness or serious local variation of flatness of the pole surfaces may lead to its rejection by the Engineer.

### 9.6 Marking of Poles

Following data of the pole shall be clearly and indelibly marked at a position approximately 1.5m above the ground level, by **embossing** the marks on **fresh** concrete, just after the casting of pole. Subsequent marking on cement mortar/grout applied **later** into the pole is **not** allowed.

- a) Letters "CEB", size and working load, date of casting, serial no. and name/identification no. of manufacturer, of the pole. No two poles belonging to

the same manufacturer could bear the same serial number. (A pre-formed template shall be used for this purpose).

- b) A line indicating the theoretical point of fixity as given in the corresponding drawings (for purpose of testing).

## **9.7 Lifting, Handling and Shifting**

Poles shall not be lifted or handled until the concrete has attained sufficient strength.

While lifting, the pole shall be held from at least two points.

## **10. INSPECTION AND TESTING OF POLES**

### **10.1 General**

The CEB shall reserve the right to inspect the Plant and Machinery and raw materials used for the manufacture of poles, manufacturing facilities, methods and systems, testing equipment and the final inspection of manufactured poles. The contractor shall provide access to the Plant at any reasonable time to the Engineer and shall provide such facilities as necessary, free of charge, for carrying out tests and inspection and provide labour, gauges, tools, materials and testing equipment/apparatus for such tests and inspection.

In case of manufactured Poles the Engineer shall have the right to reject any pole/poles with the surface finish/dimensions/markings not in accordance with Clauses 9.4, 9.5 and 9.6 respectively.

### **10.2 Testing of Poles**

Pole shall be tested as per the CEB Standards 044-3:96. One in hundred numbers of each type of poles selected at random by the Engineer will be tested in the following manner.

A pole shall be tested in the horizontal position. It shall be held rigidly at the butt end in accordance with the supported lengths on 1/9th of the total length of each pole. (Testing line is as indicated in the corresponding pole drawing).

In horizontal testing, provision shall be made with suitable supports to neutralise the bending moment as indicated in the Drawing No. DS&S/44-3/96.

Test load shall be applied at a point 0.60m from the top of the pole and raised in increments of 10% of the ultimate load. Measurements shall be taken for deflection after each increment of 10% of the ultimate load.

Load shall be reduced to zero at 40% and at 60% of ultimate load and permanent set shall be measured. Load shall be increased in steps of 10% of the ultimate load until failure occurs by maintaining each load above 60% of the ultimate load for at least two minutes (failure load is the load at which the dynamometer indicates no further increase in load).

## DRAFT CEB STANDARD 044-1: 1996

After the failure has occurred, the Pole shall be removed from the test bed, and concrete shall be broken sufficiently from any place/places as required by the Engineer, until the reinforcements and stirrups are exposed. The reinforcement should be carefully examined and verified whether the following factors are meeting the requirements of relevant drawing/specification.

- i) Type, diameter, length number of bars and positioning of the main reinforcement.
- ii) Type, diameter, shape and spacing of stirrups.
- iii) Length and correct positioning (staggered) of lap joints.

The whole batch of 100 would be acceptable to the CEB, if the tested pole passes the criteria given in (a), (b), (c), (d) and (e) below :

- a) During the application of load upto 40% of the ultimate load, the pole shall **not** have developed any hair cracks.
- b) The permanent set recorded, after removal of a test load of 60% of ultimate load shall **not** exceed 10% of the deflection recorded for same test load.
- c) The hair cracks produced while loading upto 60% of the ultimate load, shall clearly **close up** on removal of the above test load.
- d) The test load at failure shall **exceed** the ultimate load.
- e) On breaking the concrete after failure it shall be established that the following requirements are in accordance with the corresponding drawing/specification of Pole.
  - i) Type, diameter, length number of bars and positioning of the main reinforcement.
  - ii) Type, diameter, shape and spacing of stirrups.
  - iii) Length and correct positioning (staggered) of lap joints.

### 10.3 Failure to Satisfy Acceptance Criteria

In the event that a pole does not satisfy any one of the above acceptance criteria, one more pole selected randomly from the same batch shall be tested for all the five acceptance criteria. If this additional pole tested fails to satisfy any one of acceptance criteria then the entire batch shall be rejected. All the poles rejected shall be marked with a permanent ink, and removed from the site immediately.

### 10.4 The cost of all the above pole testing shall be borne by the Contractor. This includes

the cost of poles used for testing.

## **11. TRANSPORTATION & HANDLING**

### **11.1 Transport to Site**

Pole shall be stored, transported, and handled at all times with its longer axis in vertical position to ensure that the resulting forces are always resisted by the poles stronger direction.

The pole shall be transported on a suitable vehicle supported full length or with limited overhang.

### **11.2 Lifting and Storage**

While lifting, the pole shall be held from at least two points and when stacked at the manufacturing plant or at the point of delivery the poles shall be separated by timber bearers placed between each unit. Timber bearers shall be placed only on lines vertically above each other.

Transporting of poles is deemed to be completed only when the contractor hands over the poles to places nominated in the schedule of this contract.

If any damage or cracking occurs to any of the poles before they are handed over to the Engineer such poles shall be rejected. All rejected poles shall be marked with a permanent ink and removed from the site immediately.

## **12. ANNEXURES**

A -	6.0m 50kg RC Pole	-	Dr. No. DS&S/95/7710
B -	8.3m 100kg RC Pole	-	Dr. No. DS&S/95/7709
C -	8.3m 500kg RC Pole	-	Dr. No. DS&S/95/7720
D -	9.0m 115kg RC Pole	-	Dr. No. DS&S/95/7707
E -	10.0m 300kg RC Pole	-	Dr. No. DS&S/95/7705

## DRAFT CEB STANDARD 044-1: 1996

- F - Horizontal arrangements  
for pole testing - Dr. No. DS&S/44-3/96
- G - Pole Test Report

rcpole

APPENDIX ~~E~~ D

WEATHER STATION

The weather station will come complete with pole mounting hardware as well as computer interface hardware and software, any power supplies and related parts to allow for installation by user. System will not require more than general mechanical knowledge to install. PC is not required.

- Updates adjustable min of 5sec and 30mins
- Wireless transmission up to 1,000 ft. (300 m)
- Frequency-hopping spread spectrum radio for continuous data transmission and according to any local or national Afghan radio transmission restrictions
- Solar-powered with stored energy backup
- Survived cyclic corrosion tests simulating wear in extreme weather environments
- 12-hr forecasts
- Barometric pressure reporting
- RAIN COLLECTOR: Reports rain rate and rain totals. Self-emptying tipping spoon measures rain with .01" resolution for US stations and 0.2 mm resolution for EU/UK stations.
- ANEMOMETER: records wind speeds as low as 2 mph (3 km/h) and as high as 150 mph (241 km/h).
- WIND DIRECTION: Measures wind direction in compass points or degrees.
- TEMPERATURE/RELATIVE HUMIDITY: outdoor temperature and humidity sensors. Provides outside temperature readings from -40°F to 150°F (-40°C to 65°C). Outdoor sensors contained in radiation shield for optimum accuracy. Also measures relative humidity from 0 to 100%.
- BUBBLE LEVEL: Allows for more accurate installation and better data collection.
- Data logger  
Includes software on CD, data logger and cable to connect the data logger to a computer.

#### Data Storage & Transfer

User-Selectable Storage Interval. Choose 1, 5, 10, 15, 30, 60, or 120 minutes. Store up to six months worth of data depending on the storage interval. (Up to four months for Perception or Weather Wizard III.)

- Standard Data Logger. Log and store data, even when the data logger is not connected to your PC. Transfer the data as often as you like, or leave the software running to transfer it automatically each day.

- **System Requirements**

Requires Windows 2000/XP/Vista with an available USB port.



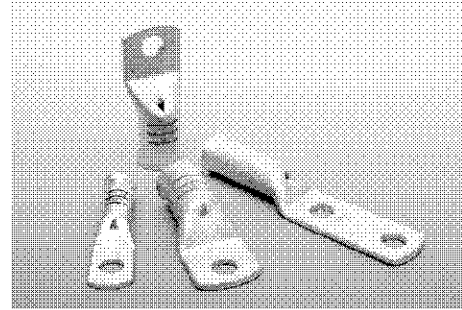
APPENDIX ~~F~~ <sup>E</sup>

TERMINAL LUGS

# IEC Standard Cable Lugs / Tube Terminals

## ● COPPER CABLES ONLY

- Available wire range : IEC standard cables of Metric Cables.
- Color coded on the barrel to eliminate errors during installation and select to easy crimping dies.
- Material : High Conductivity copper per 99.9% up with Electro-Tin Plated.
- Voltage Rating : 35kV



### ● ONE-HOLE(ROUND TYPE)

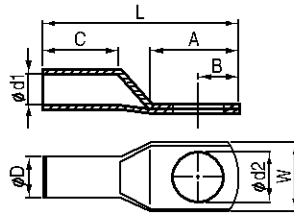


Fig. 1



UL listed

### ● ONE-HOLE(SQUARE TYPE)

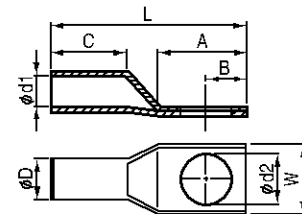


Fig. 2

Wire Range		Part No.	Stud Size	Dimension										Dies Part No.		Drawing
CODE	FLEX.			W	Ø D	Ø d1	Ø d2	A	B	C		L		AWG	mm	
10	10	PPEO0101 -xx05-	5	9	6.6	4.6	5.4	14	6.2	15	21	33	39	DAR8	DAR10	Fig 1 Fig 2
		-xx06-	6				6.4									
		-xx08-	8	15			8.4	20	8.2				39	45		
		-xx10-	10				10.5									
		-xx12-	12	18			13	23	10.7				43	49		
16	16	PPEO0102 -xx05-	5	10.5	7.5	5.5	5.4	14	6.2	15	21	33	39	DAR6	DAR16	
		-xx06-	6				6.4									
		-xx08-	8	15.5			8.4	20	8.2				39	45		
		-xx10-	10				10.5									
		-xx12-	12	18			13	23	10.7				43	49		
25	25	PPEO0103 -xx05-	5	13	9.5	7.2	5.4	17	7	17	23	40	46	DAR4	DAR25	
		-xx06-	6				6.4									
		-xx08-	8				8.4									
		-xx10-	10	15.5			10.5	23	10.7				44	50		
		-xx12-	12	18			13									
35		PPEO0104 -xx05-	5	16	11	8.5	5.4	20	9.3	20	26	46	52	DAR2	DAR35	
		-xx06-	6				6.4									
		-xx08-	8				8.4									
		-xx10-	10				10.5									
		-xx12-	12	18			13	23	10.7				50	56		
	35	-xx05-F	5	17	12	8.8	5.4	22	10	20	26	48	54	DARF2	DARF35	
		-xx06-F	6				6.4									
		-xx08-F	8				8.4									
		-xx10-F	10				10.5									
		-xx12-F	12				13									
50	35	PPEO0105 -xx05-	5	17.5	12	9.5	5.4	22	10.7	20	35	50	65	DAR1	DAR50	
		-xx06-	6				6.4									
		-xx08-	8				8.4									
		-xx10-	10				10.5									
		-xx12-	12				13									
		-xx14-	14	23			15	28	13				55	70		
		-xx16-	16				17									
	50	PPEO0106 -xx05-	5	19	13.2	10.2	5.4	25	11	20	35	52	67	DAR1/0	DARF50	
		-xx06-	6				6.4									
		-xx08-	8				8.4									
		-xx10-	10				10.5									
		-xx12-	12				13									
		-xx14-	14	24			15	28	13				55	70		
		-xx16-	16				17									
70		PPEO0107 -xx08-	8	21	14.5	11.2	8.4	25	11	22	35	54	67	DAR 20	DARF70	
		-xx10-	10				10.5									
		-xx12-	12				13									
		-xx14-	14	25			15	28	13				57	70		
		-xx16-	16				17									
	70	PPEO0108 -xx08-	8	23	16	12.5	8.4	31	14.5	24	40	64	80	DARF30	DAR F70	
		-xx10-	10				10.5									
		-xx12-	12				13									
		-xx14-	14				15									
		-xx16-	16				17									
95		PPEO0109 -xx08-	8	25.5	17	13.3	8.4	31	14.5	24	40	64	80	DARF40	DAR 95	
		-xx10-	10				10.5									
		-xx12-	12				13									
		-xx14-	14				15									
		-xx16-	16				17									
	95	-xx08-F	8	26	18	14	8.4	30	14	24	37	69	82	DAR F40	DAR F 95	
		-xx10-F	10				10.5									
		-xx12-F	12				13									
		-xx14-F	14				15									
		-xx16-F	16				17									

# IEC Standard Cable Lugs / Tube Terminals

## ● HOW TO ORDER

**PPEO 0101 - XX 05 - F**

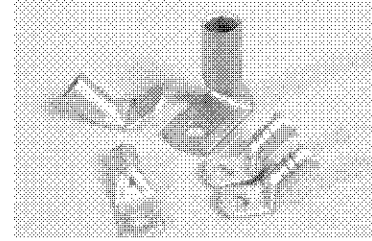
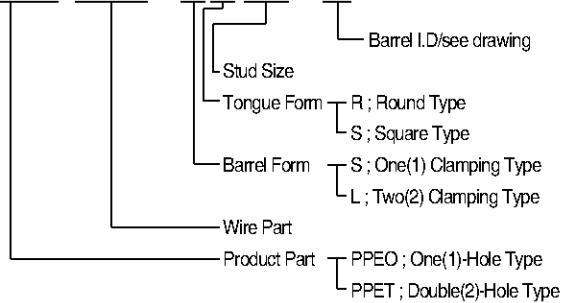


Fig. 3

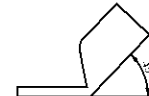


Fig. 4



Fig. 5

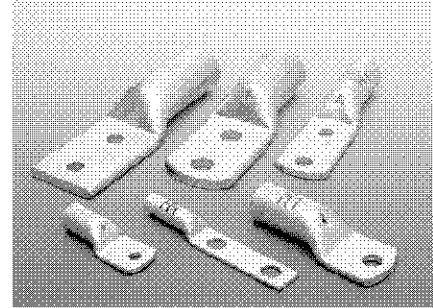
For Flex, Conductor  
(Belled End)

Wire Range		Part No.	Stud Size	Dimension										Dres Part No.		Drawing
Metric	AWG			W	ø D	ø d1	ø d2	A	B	C		L		AWG	mm	
CODE	FLEX									1-Cl.	2-Cl.	1-Cl.	2-Cl.			
120		PPEO0110 -xx08 -	8	27.5	19	15.2	8.4	31	14.5	24	50	64	90	DAR 250	DAR 120	Fig 1 Fig 2
		-xx10 -	12				10.5									
		-xx12 -	12				13									
		-xx14 -	14				15									
		-xx16 -	16				17									
150	120	PPEO0111 -xx08 -	8	31	21	16.8	8.4	31	14.5	31	50	75	94	DAR 300	DAR 150	
		-xx10 -	10				10.5								DAR 120	
		-xx12 -	12				13									
		-xx14 -	14				15									
		-xx16 -	16				17									
		PPEO0111 -xx08-F	8	31	22	17.5	8.4	35	16	30	45	80	95			
		-xx10-F	10				10.5									
		-xx12-F	12				13									
		-xx14-F	14				15									
		-xx16-F	16				17									
185	150	PPEO0112 -xx10 -	10	34	23.5	18.5	10.5	33	14.5	36	50	83	98	DAR 350	DAR 185	
		-xx12 -	12				13								DAR 150	
		-xx14 -	14				15								DAR 185	
		-xx16 -	16				17									
		-xx20 -	20				21	37	16.5			87	102			
200	185	PPEO0113 -xx10 -	10	37.5	25	20	10.5	33	14.5	40	50	88	98	DAR 400	DAR 200	
		-xx12 -	12				13								DAR 185	
		-xx14 -	14				15									
		-xx16 -	16				17									
		-xx20 -	20				21	37	16.5			92	102			
		-xx10-F	10	37.5	26	20.5	10.5	38	18	40	51	94	105			
		-xx12-F	12				13									
		-xx14-F	14				15									
		-xx16-F	16				17									
		-xx20-F	20				21									
240	240	PPEO0114 -xx10 -	10	40.5	28	22	10.5	34	14.5		50		102	DAR 500	DAR 240	
		-xx12 -	12				13							DAR 125-26	DAR 125-26	
		-xx14 -	14				15									
		-xx16 -	16				17									
		-xx18 -	18				19									
		-xx20 -	20				21	46	22			114				
		-xx24 -	24				25									
300		PPEO0115 -xx10 -	10	43.5	30.5	24	10.5	36	15		54		110	DAR 600	DAR 300S	
		-xx12 -	12				13							DAR 150-29	DAR 240	
		-xx14 -	14				15								DAR 150-29	
		-xx16 -	16				17									
		-xx20 -	20				21	48	22			122				
		-xx24 -	24				25									
		PPEO0116 -xx10-F	10	46	32	25	10.5	48	22		57		125	DAR 180-30	DAR 180-30	
		-xx12-F	12				13									
		-xx14-F	14				15									
		-xx16-F	16				17									
		-xx20-F	20				21									
		-xx24-F	24				25									
400		-xx12 -	12	49	34	26.5	13	36	15		57		127	DAR 200-32	DAR 200-32	
		-xx14 -	14				15									
		-xx16 -	16				17									
		-xx20 -	20				21	48	24			131				
		-xx24 -	24				25									
500		PPEO0117 -xx12 -	12	56.5	40	30	13	36	15		60		122	DAR 240-38	DAR 240-38	
		-xx14 -	14				15									
		-xx16 -	16				17									
		-xx20 -	20				21	48	24			135				
		-xx24 -	24				25									
630		PPEO0118 -xx12 -	12	64.5	45	35.5	13	48	23		70		150	DAR 325-38	DAR 325-38	
		-xx14 -	14				15									
		-xx16 -	16				17									
		-xx20 -	20				21									
		-xx24 -	24				25									

# IEC Standard Cable Lugs / Tube Terminals

## ● COPPER CABLES ONLY

- Available wire range : IEC standard cables of Metric Cables.
- Color coded on the barrel to eliminate errors during(IEC61238:2003) installation and select to easy crimping dies.
- Material : High Conductivity copper per 99.9% up with Electro-Tin Plated.
- Voltage Rating : 35kV



### ● TWO-HOLE(ROUND TYPE)

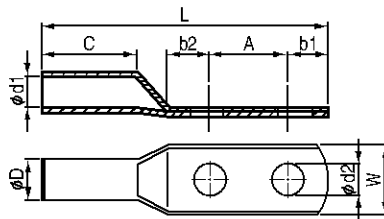


Fig. 1



### ● TWO-HOLE(SQUARE TYPE)

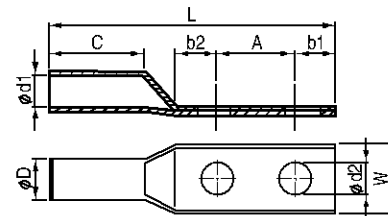


Fig. 2

Wire Range		Part No.	Stud Size	Dimension										Dies Part No.		Drawing
CODE	FLEX.			W	ø D	ø d1	ø d2	A	b1=b2 ±2	C	1-Cl.	2-Cl.	1-Cl.	2-Cl.	AWG	mm
10	10	PPET0201 -xx05 -	5	9	6.6	4.6	5.4	16	8	15	30	52	67	DAR8	DAR10	Fig 3 Fig 4
		-xx06 -	6	15			6.4	19	14			67	82			
		-xx08 -	8				8.4									
		-xx10 -	10				10.5									
		-xx12 -	12	18			13	22				70	85			
16	16	PPET0202 -xx05 -	5	15	7.5	5.5	5.4	16	8	15	30	52	67	DAR6	DAR16	
		-xx06 -	6				6.4									
		-xx08 -	8	15			8.4	19	14			67	82			
		-xx10 -	10				10.5									
		-xx12 -	12	18			13	22				70	85			
25	25	PPET0203 -xx05 -	5	13	9.5	7.2	5.4	16	8	17	33	54	70	DAR4	DAR25	
		-xx06 -	6				6.4									
		-xx08 -	8				8.4	19	14			70	86			
		-xx10 -	10	15			10.5									
		-xx12 -	12	18			13	22				73	89			
35		PPET0204 -xx05 -	5	16	11	8.5	5.4	19	9	20	33	62	75	DAR2	DAR35	
		-xx06 -	6				6.4									
		-xx08 -	8				8.4		14			72	85			
		-xx10 -	10				10.5									
		-xx12 -	12	18			13	22				75	88			
35	38	-xx05-F	5	17	12	8.8	5.4	44.5	14	20	40	97	117	DARF2	DARF35	
		-xx06-F	6				6.4									
		-xx08-F	8				8.4									
		-xx10-F	10				10.5									
		-xx12-F	12				13									
50	35	PPET0205 -xx05 -	5	17.5	12	9.5	5.4	44.5	14	20	35	97	112	DAR1	DAR50	
		-xx06 -	6				6.4									
		-xx08 -	8				8.4									
		-xx10 -	10				10.5									
		-xx12 -	12				13									
		-xx14 -	14	23			15		17			103	115			
		-xx16 -	16				17									
	50	PPET0206 -xx05 -	5	19	13.2	10.2	5.4	44.5	14	20	35	100	115	DAR1/0 DAR F1	DARF50	
		-xx06 -	6				6.4									
		-xx08 -	8				8.4									
		-xx10 -	10				10.5									
		-xx12 -	12				13		17			106	121			
		-xx14 -	14	24			15									
		-xx16 -	16				17									
70		PPET0207 -xx08 -	8	21	14.5	11.2	8.4	44.5	14	24	45	108	128	DAR 2/0 DARF1/0	DARF70	
		-xx10 -	10				10.5									
		-xx12 -	12				13		17			111	130			
		-xx14 -	14	25			15									
		-xx16 -	16				17									
	70	PPET0208 -xx08 -	8	23	16	12.5	8.4	44.5	14	24	45	106	130	DAR 3/0 DARF2/0	DAR F70	
		-xx10 -	10				10.5									
		-xx12 -	12				13		17			112	128			
		-xx14 -	14				15									
		-xx16 -	16				17									
95		PPET0209 -xx08 -	8	25.5	17	13.3	8.4	44.5	14	24	40	106	122	DARF3/0	DAR 95	
		-xx10 -	10				10.5									
		-xx12 -	12				13		17			112	128			
		-xx14 -	14				15									
		-xx16 -	16				17									
	95	-xx08-F	8	26	18	14	8.4	44.5	14	24	47	112	135	DARF4/0	DAR F95	
		-xx10-F	10				10.5									
		-xx12-F	12				13		17							
		-xx14-F	14				15									
		-xx16-F	16				17									

# IEC Standard Cable Lugs / Tube Terminals

## HOW TO ORDER

**PPEO 0101 - XX05 - F**

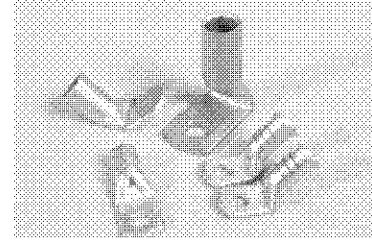
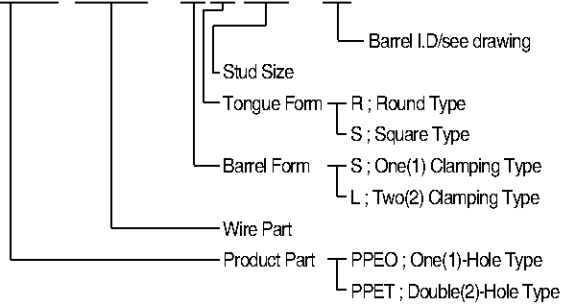


Fig. 3

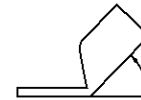


Fig. 4



Fig. 5

For Flex, Conductor  
(Beveled End)

Wire Range		Part No.	Stud Size	Dimension										DIN Part No.		Drawing
CODE	FLEX			W	ø D	ø d1	ø d2	A	b1=b2 ±2	C		L		AWG	mm	
120		PPET0210 -xx08 -	8	27.5	19	15.2	8.4	44.5	14	24	50	112	137	DAR 250	DAR120	Fig 3 Fig 4
		-xx10 -	12				10.5									
		-xx12 -	12				13									
		-xx14 -	14				15		17			115	140			
		-xx16 -	16				17									
150	120	PPET0211 -xx08 -	8	31	21	16.8	8.4	44.5	17	30	50	122	142	DAR300	DAR150	
		-xx10 -	10				10.5								DAR F120	
		-xx12 -	12				13									
		-xx14 -	14				15									
		-xx16 -	16				17									
		-xx08-F	8	31	22	17.5	8.4	44.5	17	30	50	124	147			
		-xx10-F	10				10.5									
		-xx12-F	12				13									
		-xx14-F	14				15									
		-xx16-F	16				17									
185	150	PPET0212 -xx10 -	10	34	23.5	18.5	10.5	44.5	17	35	50	129	144	DAR 350	DAR185	
		-xx12 -	12				13								DAR F150	
		-xx14 -	14				15									
		-xx16 -	16				17									
		-xx20 -	20				21									
200		PPET0113 -xx10 -	10	37.5	25	20	10.5	44.5	17	35	50	129	144	DAR 400	DAR200	
		-xx12 -	12				13								DAR F185	
		-xx14 -	14				15									
		-xx16 -	16				17									
		-xx20 -	20				21									
	185	-xx10-F	10	37.5	26	20.5	10.5	44.5	17	40	57	138	155			
		-xx12-F	12				13									
		-xx14-F	14				15									
		-xx16-F	16				17									
		-xx20-F	20				21									
240	240	PPET0214 -xx10 -	10	40.5	28	22	10.5	44.5	17	40	57	142	159	DAR 500	DAR 240	
		-xx12 -	12				13							DAR 125-26	DAR 125-26	
		-xx14 -	14				15									
		-xx16 -	15				17									
		-xx20 -	20				21		20			147	162			
		-xx24 -	24				25									
300		PPET0215 -xx10 -	10	43.5	30.5	24	10.5	44.5	20		60		162	DAR 600	DAR 300S	
		-xx12 -	12				13							DAR 150-29	DAR F240	
		-xx14 -	14				15								DAR 150-29	
		-xx16 -	16				17									
		-xx20 -	20				21									
		-xx24 -	24				25									
		PPET0216 -xx10-F	10	46	32	25	10.5	44.5	20		66		168	DAR 180-30	DAR 180-30	
		-xx12-F	12				13									
		-xx14-F	14				15									
		-xx16-F	16				17									
		-xx20-F	20				21									
		-xx24-F	24				25									
400		-xx12 -	12	49	34	26.5	13	44.5	21		66		168	DAR 200-32	DAR 200-32	
		-xx14 -	14				15									
		-xx16 -	16				17									
		-xx20 -	20				21									
		-xx24 -	24				25									
500		PPET0217 -xx12 -	12	56.5	40	30	13	44.5	21	60	73	176	189	DAR 240-38	DAR 240-38	
		-xx14 -	14				15									
		-xx16 -	16				17									
		-xx20 -	20				21									
		-xx24 -	24				25									
630		PPET0218 -xx12 -	12	64.5	45	35.5	13	44.5	23		70		195	DAR 325-38	DAR 325-38	
		-xx14 -	14				15									
		-xx16 -	16				17									
		-xx20 -	20				21									
		-xx24 -	24				25									

APPENDIX ~~G~~ F

TECHNICAL DATA

OVERHEAD LINE CONDUCTORS

### Technical Data for Overhead Line Conductor ACSR 120/20 mm<sup>2</sup>

Designation	Unit	Required	Offered
<b>Manufacturer's name</b>			
<b>Type</b>			
<b>Nominal cross-section</b>		<b>To be specified</b>	
<b>Cross-section ratio AL/St approx.</b>		<b>Aluminium conductor</b>	
<b>Steel</b>		<b>Steel – reinforced</b>	
- construction		<b>(ACSR)</b>	
- diameter	mm <sup>2</sup>	<b>120/20</b>	
- cross-section		<b>6</b>	
<b>Aluminum</b>	mm	<b>1.9</b>	
- construction	mm	<b>5.7</b>	
- cross-section	mm <sup>2</sup>	<b>19.8</b>	
<b>Total cross-section</b>	mm	<b>2.44</b>	
<b>Conductor diameter approx.</b>	mm <sup>2</sup>	<b>121.6</b>	
<b>Conductor weight</b>	mm <sup>2</sup>	<b>141.4</b>	
- steel	mm	<b>15.5</b>	
- aluminium	kg/km	<b>155</b>	
- grease	kg/km	<b>335</b>	
- with grease total approx.	kg/km	<b>2.9</b>	
<b>Current carrying capacity</b>	kgkm	<b>493</b>	
<b>Nominal conductor breaking load</b>	A	<b>410</b>	
<b>Calculated conductor resistance at 20°</b>	N	<b>45,650</b>	
<b>C</b>	Ω/km	<b>0.237</b>	
<b>Standard length per reel approx.</b>	m	<b>to be specified</b>	
<b>Dispatch reel nominal size</b>	m	<b>to be specified</b>	
<b>Standard specifications</b>		<b>IEC 209</b>	
		<b>DIN 48204</b>	